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**HISTORIÆ NATURALIS CLASSICA, LXIV**

HISTORIÆ NATURALIS CLASSICA.

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J. CRAMER ET H. K. SWANN

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TOMUS LXIV

MATERIALS FOR A  
CARCINOLOGICAL FAUNA  
OF INDIA

BY

A. ALCOCK



REPRINT 1968

VERLAG VON J. CRAMER · 3301 LEHRE

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1968

MATERIALS  
FOR A  
CARCINOLOGICAL FAUNA OF INDIA.

No. 1.

THE BRACHYURA OXYRHYNCHA.

BY  
A. ALCOCK, M.B., C.M.Z.S.,  
SUPERINTENDENT OF THE INDIAN MUSEUM.

[*Reprinted from the "Journal Asiatic Society of Bengal,"*  
*Vol. LXIV. Part II, No. 2, 1895.*]



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*Materials for a Carcinological Fauna of India. No. 1. The Brachyura Oxyrhyncha.*—By A. ALCOCK, M.B., C.M.Z.S., Superintendent of the Indian Museum.

Plates III-V.

[Received 11th April:—Read 1st May.]

It was the intention of my immediate predecessor and late friend James Wood-Mason to write a Descriptive Catalogue of the collection of Crustacea in the Indian Museum.

To this end he had collected a very comprehensive Crustacean literature, and had set in motion a scheme for extracting in a handy form the references contained therein.

He had also roughly sorted the whole collection into its component great-groups, and had made a large number of identifications.

In short he had, before his sad and premature death, collected the raw material for, and sketched the broad foundations of, a work that, had he lived on in unimpaired health, might have been a fit companion and sequel to the classical volumes of that great naturalist Henri Milne-Edwards.

Only in the case of the *Stomapoda* had he gone further than this; and I am now preparing to edit, from the rough MS. notes at my disposal, his account of a part of this Order as represented in the collection of the Indian Museum.

The present paper is the first of a series in which I hope to be able to turn to some—though inadequate—account the mass of material accumulated by my predecessor.

My own work in this paper has been to complete, to arrange systematically, to collate, and to verify the available references to the literature of the Oxyrhyncha; to determine about 70 per cent. of the Indian species contained in the collection of the Indian Museum; to prepare the generic diagnoses and the descriptions of all the species mentioned; and to work out, to the best of my ability, keys—which I hope may be of use to naturalists in India—to sub-families, genera, and species.

In the arrangement of the group as a whole, I have been guided and assisted by the *Revision of the Maioid Crustacea*, by Mr. E. J. Miers.



in the Journal of the Linnæan Society (Zoology), Vol. XIV. 1879; and by the same author's *Report on the 'Challenger' Brachyura*; and to these important works I have here to acknowledge my great indebtedness.

I have not, however, been able to give my complete adherence to the classification proposed by Mr. Miers, further than to accept the previously adopted division of the Oxyrhyncha into two groups of equal value—the Maioids and the Parthenopoids. To these groups, I would, following Dr. Claus, give the rank of families—*Maiidæ* and *Parthenopidæ*.

But to further sub-divide a group like the Maioids—in which we find, as Miers himself remarks, every reasonable gradation of form from *Stenorhynchus* to *Pericera*—into separate families, as is done by Miers, involves, I think, an unnecessary and unphilosophical interference with the meaning of the term 'family.'

Nor is anything gained, from the point of view of the practical systematist, by establishing families which overlap in all directions.

I am so much indebted to the works of Mr. Miers, that I should be loath to criticize them in any but a friendly spirit. But it seems to me that while Mr. Miers has recognized the value of certain characters round the developments and modifications of which the Maioid Crabs easily cleave into most natural groups, he has proceeded in practice to ignore in great measure the value of his own generalization.

It appears to me that Mr. Miers' families of *Maiinea* consist each of a quite natural nucleus hidden in a loose artificial wrapping.

Beginning with the *Inachidæ* of Miers, we find a natural group, typified by such forms as *Leptopodia* and *Inachus*, linked with forms like *Anamathia*, *Xenocarcinus*, *Huenia*, *Pugettia*, *Acanthonyx*, *Doclea* and *Stenorionops*, none of which are any more nearly related to *Leptopodia* and *Inachus* than they are to any other Maioid.

In the *Maiidæ* of Miers again, we find a most arbitrary jumble of forms. Amid the confusion, however, we can discern a large natural nucleus, typified not, it is true, by *Maia*, but by such forms as *Egeria*, *Chioneetes*, *Pisa*, *Naxia*, etc.; but these are no more nearly related to *Maia*, *Paramithrax*, *Schizophris*, *Oriocarcinus*, and *Micippa* than they are to any other Maioid.

The third family, *Periceridæ*, is even more bewildering; but as Miers himself, in his *Report on the 'Challenger' Brachyura*, has distributed many of his original Periceroid genera among the other two families, it would be unjust to enter into any detailed criticism of this family now.

The classification proposed in this paper is in many respects a reversion to the older authors.

For a most interesting and instructive historical and critical review of the Oxyrhyncha as a whole, I would refer to the Introduction of Miers' paper, already cited, in the Journal of the Linnæan Society, Zoology, Vol. XIV. 1879, pp. 634-642.

I have only to add that as almost all the new species described in this paper have been dredged by the 'Investigator,' they will be figured in next year's issue of the "Illustrations of the Zoology of the 'Investigator.'"

### Tribe OXYRHYNCHA or MAIOIDEA.

*Ozyrinques, Ozyrinchi*, Latr. Hist. Nat. Crust. et Insect. tom. VI. p. 85.

*Ozyrhinques et Canceriens Cryptopodes*, Milne-Edwards, Hist. Nat. Crust. tom. I. pp. 263, 368.

*Maioidea* or *Ozyrhyncha*, Dana, U. S. Expl. Exp. Crust. Pt. I. pp. 66, 67 and 75.

*Ozyrhyncha*, Miers, Journ. Linn. Soc., Zool., Vol. XIV. 1879, p. 634; and 'Challenger' Brachyura, p. 2.

Carapace more or less narrowed in front, and usually produced to form a rostrum: branchial regions considerably developed, hepatic regions small. Epistome usually large; buccal cavity quadrate, with the anterior margin usually straight. Branchiæ almost always nine in number on either side\*: their efferent channels open at the sides of the endostome or palate. Antennules longitudinally folded. The palp of the external maxillipeds is articulated either at the summit or at the antero-internal angle of the meropodite. The external genitalia of the male are inserted at the bases of the fifth pair of trunk-legs.

The Oxyrhyncha may be sub-divided into two families, namely:—

(1) the *Maidæ*, in which the basal joint of the antennæ is well developed, and in which it is exceptional to find the chelipeds vastly longer than the other legs;

and (2) the *Parthenopidæ*, in which the basal joint of the antennæ is very small, and is embedded between the front and the floor of the orbit, and in which it is exceptional not to find the chelipeds vastly longer and vastly more massive than the other legs.

\* *Encephaloides* is the only Oxyrhynch known to me in which the branchiæ are less than nine in number on either side: in *Encephaloides* the reduction, both in size and number, of the anterior branchiæ seems to be due to the enormous development of the four posterior branchiæ.

## Family I. MAIIDÆ.

*Macropodiens* and *Maiens*, Milne-Edwards, Hist. Nat. Crust. I. 272.

*Matinea*, Dana, U. S. Expl. Exp. Crust. Pt. I. pp. 76 and 77, (and *Oncininea*.)

*Mainea*, Miers, Journ. Linn. Soc., Zool., Vol. XIV. 1879, p. 640; and 'Challenger' Brachyura, p. 2.

Basal antennal joint well developed, and occupying all the space between the antennular fossa and the eye.

Taking the characters sagaciously suggested by Miers, namely, the relative development of the component parts of the orbit, including basal antennal joint—as the basis of a division, the members of the family *Maiidæ* fall into four natural groups or sub-families as follows:—

*Key to the Sub-families of Maiidæ.*

Sub-family I. *Inachinæ*. Eyes without orbits: the eyestalks, which are generally long, are either non-retractile, or are retractile against the sides of the carapace, or against an acute post-ocular spine that affords no concealment. The basal joint of the antennæ is extremely slender throughout its extent, and is usually long:—

Alliance 1. *Leptopodioida*. Basal joint of the antennæ usually sub-cylindrical, or at any rate convex ventrally, often independent of the neighbouring structures: the external maxillipeds have the merus narrower than the ischium, and the palp large and coarse, and hence have a somewhat pediform appearance.

Alliance 2. *Inachoida*. Basal joint of the antennæ flattened or concave ventrally, and intimately fused with the neighbouring parts; its antero-external angle often produced to form a spine visible from above: the external maxillipeds have the merus at least as broad as the ischium, and the (small) palp borne at the internal angle of the merus.

Sub-family II. *Acanthonychinæ*. Eyes without true orbits: the eyestalks, which are very short or sometimes even obsolescent, are either concealed beneath a forwardly-produced supra-ocular spine, or are sunk in the sides of a huge beak-like rostrum; a postocular spine or process is sometimes present, but is not excavated for the reception of the retracted eye. The basal antennal joint is truncate-triangular. The external maxillipeds have the merus as broad as the ischium.

Sub-family III. *Pisinae*. Eyes with commencing orbits, of which one of the most characteristic parts is a large, blunt, usually but not

always isolated, cupped post-ocular process into which the eye is retractile, but never to such an extent as to completely conceal the cornea from dorsal—still less from ventral—view; there is almost always also a distinct supraocular eave, which is sometimes produced forwards as a spine: the eyestalks are short. The basal antennal joint is broad; its antero-external angle is generally produced forwards, as a spine or tooth. The external maxillipeds have the merus as broad as the ischium.

Alliance 1. *Pisoida*. Post-ocular cup distinctly isolated from the supra-ocular eave by a gap or fissure.

Alliance. 2. *Lissoida*. Post-ocular cup in the closest contact with the supra-ocular eave, a suture only intervening.

Sub-family IV. *Maiinæ*. Eyes either (1) with orbits, which may be incomplete or complete, but are always complete enough to entirely conceal the fully retracted cornea from dorsal view; or (2) but partially protected by a huge horn-like or antler-like supra-ocular spine, or by a large jagged post-ocular tooth (*Paramicippa tuberculosa*, Edw.), or by both. The eyestalks are usually long.

The orbit, when present, is formed in one of two ways; there is always an arched—often very strongly arched—supra-ocular eave, and a prominent post-ocular spine; and either (1) the interval between the eave and the spine is filled by another spine, in which case the roof of the orbit, though fissured, is fairly complete; or (2) the supra-ocular eave and the post-ocular spine are in contact with one another above, and below with a process of the basal antennal joint, in which case the orbit has not only a complete or nearly complete roof, but a complete or nearly complete floor also.

The basal antennal joint is always very broad, and is either very extensively produced outwards to aid in forming the floor of the orbit, or is armed distally with one or two large spines.

The external maxillipeds have the merus at least as wide as the ischium.

Alliance 1. *Maioida*. The orbit is formed (1) by a supra-ocular hood, the posteró-external angle of which is often produced as a spine, (2) by a sharp post-ocular tooth, and (3) by a spine intercalated between the two. Basal antennal joint broad, but not specially produced to form a floor to the orbit; usually armed at both its anterior angles with a strong spine.

Alliance 2. *Stenocionopoida*. There is no true orbit; but either a huge, outstanding, often more or less hollowed, horn-like or antler-like supra-ocular spine, or a postocular tooth, or both. The basal antennal

joint is broad, and either has, or has not, one or both of its anterior angles armed with a strong spine. The merus of the external maxillipeds usually has its antero-external angle strongly dilated; and the buccal frame is often much wider in front than behind.

Alliance 3. *Periceroida*. The carapace is broadened anteriorly by the outstanding, often tubular, orbits: the orbits are formed (1) by an arched supra-ocular hood, or semi-tubular horn, (2) by a hollowed post-ocular process, and (3) by a remarkable broadening, or by a prolongation, of the anterior part of the basal antennal joint; and they afford complete concealment to the retracted eye. The rostrum is often more or less deflexed.

I am afraid that this last sub-family will, at first, meet with hostile criticism; but I feel pretty sure that it is a natural group. For, taking the nature of the orbits, eyes, and basal antennal joint as the primary bond of relation, we find, if we exclude the aberrant *Stenocionopoida*, a regular gradation from the imperfect orbit and the narrower basal antennal joint of *Maia*, through the more perfect orbit and broader basal antennal joint of, e.g., *Micippa thalia* and *Micippa cristata*, to the perfect tubular orbit of *Microphrys* (if *Microphrys cornutus* be the type), *Tiarinia* and *Macroceloma*. The *Stenocionopoida* again are linked on, through *Picrocerus* and *Picroceroides*, to the *Periceroida*; and, on the other hand, through *Criocarcinus* to the Maioid *Chlorinoides*. •

The following is a list of the genera of Maioid Crabs, so far as known to me, arranged in accordance with the afore-proposed classification. Within each sub-family the genera are arranged alphabetically. Indian genera are printed in roman type, and all genera known to me by autopsy are marked with an asterisk.

Complete references are not given; but only references to the best diagnoses with which I am acquainted. The bibliography of Indian genera will be found in the sequel.

### Family **Maiidæ**.

#### Sub-family I. *Inachinæ*.

#### ALLIANCE I. LEPTOPODIOIDA.

\* *Acheus*.

*Acheopsis*, Stimpson, Proc. Ac. Nat. Sci. Philad., 1857, p. 219.

† *Anisonotus*, A. Milne-Edwards, Miss. Sci. Mex. Crust. I. p. 195.

\* *Camposcia*.

*Cyrtomaia*, Miers, 'Challenger' Brachyura, p. 14.

\* *Echinoplax*.

*Ergasticus*, A. M.-E., Miers, 'Challenger' Brachyura, p. 29.

*Ericerus*. Mary J. Rathbun, Proc. U. S. Nat. Mus., Vol. XVI. p. 223.

*Leptopodia*, Leach, Zool. Miscell. II. 15: Milne-Edwards Hist. Nat. Crust. I. 275 (Synonymy see Miers, Journ. Linn. Soc. Zool. XIV. 1879, p. 643).

*Lispognathus*, A. Milne-Edwards, Bull. Mus. Comp. Zool. Vol. VIII. 1880-81, p. 9; and Miss. Sci. Mex. Crust. I. p. 349: and Miers 'Challenger' Brachyura, p. 27.

\* *Macrocheira*, de Haan, Faun. Japon. Crust., p. 88: and Miers, 'Challenger' Brachyura, p. 33.

*Metoporphis*, Stimpson, Ann. Lyc. Nat. Hist., New York, Vol. VII. 1862, p. 198.

\* *Oncinopus*.

*Pactolus*, Leach, Zool. Miscell. II. 19: Milne-Edwards, Hist. Nat. Crust. II. 189.

\* *Paratymolus*.

\* *Platymaia*.

*Pleistacantha*, Miers, P. Z. S., 1879, p. 24.

*Podochela*, Stimpson, Ann. Lyc. Nat. Hist., New York, Vol. II. 1862, p. 194, (Synon. *Podonema*, Stimpson, Bull. Mus. Comp. Zool., Vol. II. 1870-71, p. 126).

\* *Stenorhynchus*, Lamk., Milne-Edwards, Hist. Nat. Crust. I. 278 (Syn. Miers, Journ. Linn. Soc. Zool., XIV. 1879, p. 643).

*New genera*:—*Lambrachæus*, *Physachæus*, *Grypachæus*.

#### ALLIANCE II. INACHOIDA.

*Anacinetops*, Miers, Ann. Mag. Nat. Hist. 1879, Vol. IV. p. 3.

*Anasimus*, A. Milne-Edwards, Miss. Sci. Mex. Crust. I. p. 360.

*Anomalopus*, Stimpson, Bull. Mus. Comp. Zool. II. 1870-71, p. 121.

\* *Apocremnus*.

*Arachnopsis*, Stimpson, Bull. Mus. Comp. Zool. II. 1870-71, p. 121.

*Batrachonotus*, Stimpson, Bull. Mus. Comp. Zool. II. 1870-71, p. 122.

\* *Collodes*.

\* *Encephaloides*.

*Erioleptus* (? = *Anasimus*), Mary J. Rathbun, Proc. U. S. Nat. Mus. Vol. XVI. 1893, page 226.

??? *Eucinetops*, Stimpson, Ann. Lyc. Nat. Hist. New York, Vol.

VII. 1862, p. 191 (more probably, as Stimpson himself suggested, allied to *Micippa*).

*Euprognatha*, Stimpson, Bull. Mus. Comp. Zool. II. 1870-71, p. 122.

*Eurypodius*, Guérin; Milne-Edwards, Hist. Nat. Crust. I. 283.

*Gonatorhynchus*, Haswell, Cat. Austral. Crust., p. 10.

*Halimus*, Latr., Edw., Milne-Edwards, Hist. Nat. Crust. I. 340.

\* *Inachus*, Fabr., Edw., Milne-Edwards, Hist. Nat. Crust. I. 286.

\* *Inachoides*.

\* *Microhalimus*, Haswell, Cat. Austral. Crust., p. 7.

*Neorhynchus*, A. Milne-Edwards, Miss. Sci. Mex. Crust. I. p. 186, (= *Microrhynchus*, Bell, P. Z. S., 1835, p. 88, and Trans. Z. S. II. 1841, p. 40).

*Oregonia*, Dana, U. S. Expl. Exp. Crust. I. p. 105.

*Pyromaia*, Stimpson, Bull. Mus. Comp. Zool. II. 1870-71, p. 109.

\* *Trichoplatus*, A. Milne-Edwards, Ann. Sci. Nat. (6) IV. 1876, Art. 9, p. 2.

#### Sub-family, II. *Acanthonychidæ*.

\* *Acanthonyx*.

*Antilibinia*, Macleay, in Smith's Ill. Zool. S. Africa, p. 56.

*Cyclonyx*, Miers, Ann. Mag. Nat. Hist., 1879, Vol. IV. p. 6.

*Dehaaninus*, Macleay, in Smith's Ill. Zool. S. Africa, p. 57.

*Epialtus*, Milne-Edwards, Hist. Nat. Crust. I. 344.

*Eupleurodon*, Stimpson, Ann. Lyc. Nat. Hist. New York, Vol. X. 1874, p. 98.

*Goniothorax*, A. Milne-Edwards, Bull. Soc. Philom. (7) III. 1878-79, p. 103.

\* *Huenia*.

*Leucippa*, Milne-Edwards, Hist. Nat. Crust. I. 345.

*Mimulus*, Stimpson, Ann. Lyc. Nat. Hist., New York, Vol. VII. 1860, p. 199.

*Peltinia*, Dana, U. S. Expl. Exp. Crust. I. p. 129.

\* *Menæthius*.

*Mocosoa*, Stimpson, Bull. Mus. Comp. Zool. II. 1870-71, p. 128.

\* *Pugettia*.

? \* *Seyramathia*.

\* *Simocarcinus*.

\* *Sphenocarcinus*, (? = *Oxypleurodon*, Meirs, 'Challenger' Brachyura, p. 38.)

*Trigonothir*, Miers, Ann. Mag. Nat. Hist. 1879, Vol. IV. p. 4

\* *Xenocarcinus*.

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Sub-family III. *Pisinæ*.

ALLIANCE I. *PISOIDA*.

*Arctopisis*, Lamk. see *Pisa* emend. Miers, *infra*.

*Acanthophrys*, A. Milne-Edwards (as limited by Miers, J. L. S. Zool. XIV. 656), Ann. Soc. Entom. Fr. (4) V. 1865, p. 141, pl. v. fig. 3.

\* *Anamathia*, Roux ; Milne-Edwards, Hist. Nat. Crust. I. 285.

*Chionæcetes*, Kroyer ; Miers, Journ. Linn. Soc. Zool. XIV. 1879, p. 654 (Syn. *Peloplastus*, see Miers, J. L. S., Zool. XIV. 654).

\* *Chorilibinia*.

*Chorinus*, Leach ; Milne-Edwards, Hist. Nat. Crust. I. 314.

\* *Doclea*.

\* *Egeria*.

? *Esopus*, A. Milne-Edwards, Miss. Sci. Mex. Crust. I. p. 89.

\* *Eurynome*, Leach ; Milne-Edwards, Hist. Nat. Crust. I. 350.

*Hoplöpisa*, A. Milne-Edwards, Bull. Soc. Philom. (7) II. 1877-78, p. 222 ; and Miss. Sci. Mex. Crust. I. p. 201.

\* *Hyas*, Leach ; Milne-Edwards, Hist. Nat. Crust. I. 311.

\* *Hyastenus* (Syn. *Lahainia* and *Chorilia*.)

*Lepteces*, Mary J. Rathbun, P. U. S. N. M., Vol. XVI. 1893, p. 83.

*Libidoclea*, Edw. and Lucas, Voy. Amer. Merid. Crust., p. 6.

\* *Libinia*, Leach ; Milne-Edwards, Hist. Nat. Crust. I. 298.

*Lepidonaxia*, Zool. Record, 1877, Crust., p. 11.

*Ibzxorhynchus*, Stimpson, Journ. Bost. Soc. Nat. Hist., Vol. VI. 1857, p. 451.

\* *Naxia* (Syn. *Naxioides* and *Podopisa*).

? *Nibilia*, A. Milne-Edwards, Miss. Sci. Mex. Crust. I. p. 132.

*Notolopas*, Stimpson, Ann. Lyc. Nat. Hist. New York, X. 1874, p. 96.

*Pelia* Bell, Trans. Zool. Soc. II. 1841, p. 44.

\* *Pisa*, Leach, Miers ; Miers, 'Challenger' Brachyura, p. 53.

? *Pisoides*, Edw. and Lucas, Voy. Amer. Merid. Crust., p. 10.

*Prionorhynchus*, Jacquinot and Lucas, Voy. Pôle Sud, l' *Astrolabe* et la *Zélée*, tom. III. Crust., p. 5.

? *Pyria*, Dana, U. S. Expl. Exp. Crust. I. p. 96.

*Rachinia*, A. Milne-Edwards, Miss. Sci. Mex., pl. xviii., fig. 1 (if this genus is distinct from *Scyramathia*).

*Salacia*, Edw. and Lucas, Voy. Amer. Merid. Crust., p. 12.

*Scyra*, Dana, U. S. Expl. Exp. Crust. I. p. 95.

? \* *Scyramathia* (Syn. ? *Rachinia*).

*Trachymaia*, A. Milne-Edwards, Bull. Mus. Comp. Zool. VIII. 1880-81, p. 3 ; and Miss. Sci. Mex. Crust. I. p. 351.



ALLIANCE II. LISSOIDA.

? *Coelocerus*, A. Milne-Edwards, Miss. Sci. Mex. Crust. I. p. 84.

*Herbstia*, Milne-Edwards, Hist. Nat. Crust. I. 301 (Syn. *Rhodia*, Bell. T. Z. S. II. 1841, p. 43; *Micropisa*, Stimpson, Proc. Ac. Nat. Sci. Philad., 1857, p. 217; *Herbstilla*, Stimpson, Ann. Lyc. Nat. Hist. New York, X. 1874, p. 93).

\* *Hoplophrys*.

*Lissit*, Leach; Milne-Edwards, Hist. Nat. Crust. I. 310.

*Parathoe*, Miers, Ann. Mag. Nat. Hist., 1879, Vol. IV. p. 16.

*Perinea*, Dana, U. S. Expl. Exp. Crust. I. p. 114.

\* *Tylocarcinus*.

Sub-family IV. *Maiaæ*.

ALLIANCE I. MAIOLIDA.

\* *Cyclax* (*Cyclomaia*).

\* *Maia*.

*Maiella*, Ortmann, Zool. Jahrb. Syst. &c., VII. 1893-94, p. 51.

*Maiopsis*, Faxon, Bull. Mus. Comp. Zool., XXIV. 1893, p. 150.

*Nemausa*, A. Milne-Edwards, Miss. Sci. Mex. Crust. I. p. 80.

\* *Paramithrax* (\* *Leptomithrax*, \* *Chlorinoides*).

? *Phycodes*, A. Milne-Edwards, Rev. et Mag. Zool. (2) XXI. 1869.  
p. 374.

? *Pleurophricus*, A. Milne-Edwards, Journ. Mus. Godeffr., I. Crust.  
p. 260.

\* *Schizophrys* (*Dione*).

*Tennonotus*, A. Milne-Edwards, Miss. Sic. Mex. Crust. I. p. 82.

ALLIANCE II. STENOCIONOPOIDA.

\* *Criocarcinus*.

? *Eucinetops*, Stimpson, Ann. Lyc. Nat. Hist. New York, VII.  
1862, p. 191.

\* *Paramicippa*, Edw. Milne-Edwards, Hist. Nat. Crust. I. 332.

*Picrocerus*, A. Milne-Edwards, Ann. Soc. Ent. Fr. (4) V. 1865, p. 136.

*Pseudomicippa*, Heller, Crust. Roth. Meer., SB. Ak. Wien, XLIII.  
1861, p. 301; and Miers 'Challenger' Brachyura, p. 68 (*nec syn.* *Micro-*  
*halimus*).

*Stenocionops*.

*Stilbognathus*, E. Martens, Verh. zool.-bot. Ges. Wien, XVI. 1866,  
p. 379.

*Tyche*, Bell, P. Z. S. 1835, p. 172, and T. Z. S. II. 1841, p. 58 (*syn.*  
*Platyrrinchus*, Desbonne and Schramm, Crust. Guadeloupe, p. 3).

## ALLIANCE III. PERICEROIDA.

? *Ala*, Lockington, Proc. Calif. Acad. Sci. VII. 1876, p. 65.

*Anaptychus*, Stimpson, Ann. Lyc. Nat. Hist. New York, VII. 1862, p. 183.

? *Coelocerus*, A. Milne-Edwards, Miss. Sci. Mex. Crust. I. p. 84.

*Cyclocoeloma*, Miers, Ann. Mag. Nat. Hist. 1880, Vol. V. p. 228.

\* *Cyphocarcinus*.

*Hemus*, A. Milne-Edwards, Miss. Sci. Mex. Crust. I. p. 88.

*Leptopisa*, Stimpson, Bull. Mus. Comp. Zool. II. 1870-71, p. 114.

\* *Macrocoeloma* (*Entomonyx*: both these genera of Miers seem to me to be synonymous with *Micippoides* of A. Milne-Edwards.)

\* *Micippa*.

*Micippoides*, A. Milne-Edwards, Journ. Mus. Godeffr. I. Crust. 254 (probably *Macrocoeloma* and *Entomonyx* may be here included).

\* *Microphrys*, Edw.; Milne-Edwards, Ann. Sci. Nat. Zool. (3) XVI. 1851, p. 251; and Miers, 'Challenger' Brachyura, p. 82 (*syn. Milnia*, Stimpson, Ann. Lyc. Nat. Hist. New York, VII. 1862, p. 179: *Omala-cantha*, Hale Streets, Proc. Ac. Nat. Sci. Philad. 1871, p. 238; and A. Milne-Edwards, Miss. Sci. Mex. Crust. I. p. 64: *Fisheria*, Lockington, Proc. Calif. Ac. Sci. VII. 1876, p. 72).

*Mithrax*, Leach; Milne-Edwards, Hist. Nat. Crust. I. 317; and Miers, 'Challenger' Brachyura, p. 84 (*syn. Mithraculus*, White, *vide* Miers, J. L. S., Zool. XIV. 1879, p. 667: *Telephrys*, Stimpson, Amer. Journ. Sci and Arts. (2) XXIX. 1860, p. 133.)

*Othonia*, Bell (*Pitho*, Bell, P. Z. S. 1835, p. 172: *Othonia*, Bell T. Z. S. II. 55): and A. Milne-Edwards, Miss. Sci. Mex. Crust. I. p. 114.

*Pericera*, Latr., Edw.; Milne-Edwards, Hist. Nat. Crust. I. 334; and Miers, 'Challenger' Brachyura, p. 76.

*Picroceroides*, Miers, 'Challenger' Brachyura, p. 77.

(This genus, though placed in this alliance on account of the structure of the orbits and basal antennal joint, is in many respects more closely allied to the *Stenocionopoida*).

*Sisypus*, Desbonne Schramm, Crust. Guadeloupe, p. 20.

? *Thoe*, Bell, P. Z. S., 1835, p. 171: A. Milne-Edwards, Miss. Sci. Mex. Crust. I. p. 120 (*syn., sec.* Miers J. L. S. Zool. XIV. 667; *Platytypes*, Lockington, Proc. Calif. Ac. Sci. VII. 1876, p. 41).

\* *Tiarinia*.

The genus *Podohuenia*, placed among the *Periceridæ* in the Zoological Record for 1892 (Crust., p. 17), is inaccessible to me. The reference in the Zoological Record is to Boll. Soc. Nat. Napoli, III. 1889, p. 180.

Sub-family INACHINÆ (see Table I.).

Alliance I. LEPTOPODIOIDA (see Table I.).

LAMBRACHÆUS, n. gen.

Closely allied to *Leptopodia* and *Metoporaphis*, from which it differs (1) in its extremely long sub-cylindrical neck, (2) in its minute antennæ and (3) in the *Lambrus*-like proportions of its chelipeds.

Eyes antennules and antennæ borne at the end of a long narrow subcylindrical "neck," which is continued onwards as an extremely long slender spiny rostrum.

Eyes stoutish, salient and non-retractile: no defined orbits: a small postocular spine. Antennæ minute, exposed to dorsal view. Chelipeds stout and extremely long, with long sub-cylindrical palms and short fingers.

Legs very slender: shorter than the chelipeds.

*Lambrachæus ramifer*, n. sp., Plate III. fig. 1.

The body is formed by (1) a small trunk, (2) a long narrow almost cylindrical prestomial "neck," and (3) a long slender sinuous spiny rostrum shaped like a withered branch.

The carapace proper is trilobed, the lateral lobes being formed by the branchial regions, and the front lobe being formed by the wings of the buccal frame.

The "neck," at the end of which are borne the eyes, antennules, and antennæ, is rather longer than the carapace proper.

The rostrum is nearly twice the combined length of the neck and carapace.

The eyes are salient and non-retractile, and though there is a narrow dorsal cave round the base of the eyestalks and a pair of tiny postocular spines, there is nothing like an orbit present. The cornea is surmounted by a little tooth.

The antennæ are minute and filiform, and are completely exposed: their total length is not one-sixth that of the rostrum.

The antennules are of large proportions: they fold longitudinally, but when folded are much beyond the capacity of the narrow shallow antennular fossæ.

The external maxillipeds have broad endopodites, and completely cover the buccal frame: the merus is expanded in both directions, but most at its internal angle, so that the flagellum is inserted nearer to the external angle.



Table 1. Sub-family INACHINÆ.

Eyes without orbits; the eye-stalks usually long and slender, and either non-retractile, or retractile against the carapace or against an acute post-ocular spine or spine that affords no concealment. The basal joint of the antennæ is extremely slender throughout, and is usually long. Legs slender. Rostrum either simple, or two-spined, or emarginate (in *Platysia* apparently trifid).

*Key to the Indian Genera.*

Alliance 1. LEPROPODIONA. Antennæ with the basal joint usually sub-cylindrical, or at any rate usually convex on the ventral surface, and independent. External maxilliped with the merus narrower than the ischium, and often with a large coarse palp, and therefore somewhat pediform in shape.

	i. Chelipeds both markedly longer and vastly stouter than the longest legs: rostrum simple and much longer than the carapace: post-ocular "neck" at least as long as the carapace.....					LAMBACHEUS.	
1. Carapace of the typical Oxyrhynch shape, elongate-triangular or pyriform.	ii. Chelipeds never approaching the longest legs in length: rostrum bifid and never approaching the carapace in length: post-ocular neck, when distinct, short.	a. Free joints of the antennal peduncle slender, cylindrical and not coarsely hairy: eye-stalks almost straight: rostrum horizontal.	a <sup>1</sup> Eye-stalks salient, but freely moveable forwards and sometimes backwards: basal antennal joint not reaching to the apex of the rostrum.	a <sup>2</sup> Basal antennal joint long: epistome spacious.	a <sup>3</sup> Body and appendages very spiny: some long spines; post-ocular spinules: eye-stalks retractile backwards, but never concealed.	a <sup>4</sup> Rostrum formed of two long spines; none of the legs subchelate.....	ECHINOPLEX.
					b <sup>4</sup> Rostrum short, bifid: last pair of legs subchelate.....	GRYPACHEUS.	
					b <sup>3</sup> Body and appendages smooth or with very few spines: no post-ocular spine: the eye-stalks hardly moveable backwards.....	ACHETUS.	
					b <sup>4</sup> Basal antennal joint very short, not reaching to the front: epistome very narrow.....	PARATYTHOLUS.	
					b <sup>1</sup> Eye-stalks salient and rigidly immovable: basal antennal joint projecting beyond and above the apex of the rostrum.....	PHYTSACHETUS.	
2. Carapace semi-membranous, exceedingly depressed and flat: rostrum in unbroken continuity with the carapace: no post-ocular spine: the last pair of legs subdorsal in position.....			b. Free joints of the antennal peduncle short, flat, and densely hairy: eye-stalks much curved: rostrum somewhat depressed: a post-ocular tooth.....				CAMPONOSIA.
							ONCINOPTUS.
3. Carapace nearly circular. [Epistome narrow: a large post-ocular spine against which the eye is retractile, but which affords no concealment: basal antennal joint perfectly free, legs long, with much flattened blade-like joints: rostrum trifid.].....							PLATYSIA.

Alliance 2. INACHIONA. Antennæ with the basal joint flattened or concave on the ventral surface, and intimately fused with the surrounding parts, its antero-external angle produced to form a spine which is visible from above on either side of the rostrum. External maxillipeds with the merus as broad as or broader than the ischium, and with the palp small.

I. Rostrum simple: post-ocular spine small: basal antennal spine small or moderate.	1. Branchial regions upraised, and meeting across, and thus concealing the cardiac region: 2nd pair of trunk-legs, in the adult, many times the length of the carapace.....	2. Cardiac region not encroached upon by the normal branchial regions: 2nd pair of trunk-legs of moderate length.....	EXTREPHALOIDES.
			INACHIONIDES.
II. Rostrum bifid: post-ocular spine large: basal antennal spine large, ...	1. Eyes hardly retractile.....	2. Eyes retractile against a strong post-ocular spine.....	APOCREMUS.
			COLLOIDES.

Table 1. Sub-family INACHINÆ.

Eyes without orbits; the eye-stalks usually long and slender, and either non-retractile, or retractile against the carapace or against an acute post-ocular spinule or spine that affords no concealment. The basal joint of the antennæ is extremely slender throughout, and is usually long. Legs slender. Rostrum either simple, or two-spined, or emarginate (in *Platysia* apparently trifid).

Key to the Indian Genera.

Alliance 1. LEPIDODROMIDA. Antennæ with the basal joint usually sub-cylindrical, or at any rate usually convex on the ventral surface, and independent. External maxilliped with the merus narrower than the ischium, and often with a large coarse palp, and therefore somewhat pediform in shape.

									i. Chelipeds both markedly longer and vastly shorter than the longest legs: rostrum simple and much longer than the carapace: post-ocular "neck" at least as long as the carapace.....	LAMBACHEUS.

Alliance 2. ISACHOIDA. Antennæ with the basal joint flattened or concave on the ventral surface, and intimately fused with the surrounding parts, its antero-external angle produced to form a spine which is visible from above on either side of the rostrum. External maxillipeds with the merus as broad as or broader than the ischium, and with the palp small.

1. Rostrum simple: post-ocular spine small: basal antennal spine small or moderate.	1. Branchial regions upraised, and meeting across, and thus concealing the cardiac region: 2nd pair of trunk-legs, in the adult, many times the length of the carapace.....	ENCEPHALOIDUS.
	2. Cardiac region not encroached upon by the normal branchial regions: 2nd pair of trunk-legs of moderate length.....	ISACHOIDUS.
11. Rostrum bifid: post-ocular spine large: basal antennal spine large...	1. Eyes hardly retractile.....	APOCHEMUS.
	2. Eyes retractile against a strong post-ocular spine.....	CHALINUS.



The chelipeds, though actually slender, are relatively to the carapace as stout and long as those of the longer-armed species of *Lambrus*: they are one-third longer than the combined carapace neck and rostrum: they are sub-cylindrical and spiny: their proportions are much those of *Lambrus*, the fingers being not much more than a quarter the length of the palm. The fingers are curved, and are in contact only at their tips.

The legs, which are very slender and are not quite so long as the chelipeds, display no remarkable characters.

The figure, which represents a male magnified two diameters, shows the proportions better than any table of measurements.

*Loc.* Port Blair, Andaman Islands.

#### ACHÆUS, Leach.

*Achæus*, Leach, Malac. Podophth. Brit., Tab. XXII. fig. C.

*Achæus*, Desmarest, Consid. Gen. Crust., p. 158.

*Achæus*, Milne-Edwards, Hist. Nat. Crust. I. 281.

*Achæus*, Miers, Journ. Linn. Soc., Zool., Vol. XIV. 1879, p. 643; and 'Challenger' Brachyura, p. 8.

Carapace triangular with the branchial regions swollen, always more or less constricted behind the eyes. Rostrum very short, bifid. Eye-stalks long and hardly retractile backwards: no orbits or post-ocular spine. Antennæ with the basal joint very slender, sub-cylindrical, the other joints and the flagellum completely exposed. External maxillipeds with the meropodite long, narrower than the ischiopodite, and carrying the next joint at, or near, its apex. Chelipeds short, not very stout. Legs slender, sometimes long and filiform: the dactyli of those of the last two pairs more or less falcate. Abdomen consisting of six segments in both sexes.

As Miers has remarked, this genus is distinguished from *Stenorhynchus* only by the form of the rostrum, which consists of two short lobes instead of two long spines.

#### Key to the Indian species of the genus *Achæus*.

- I. Carapace with a post-ocular constriction, but with no long post-ocular "neck:" dactyli of last pair, or two pair, of legs strongly falciform:—
  1. Carapace and eye-stalks smooth ... *A. lacertosus*.
  2. Carapace with a bilobed prominence on the cardiac region: eye-stalks with a tubercle on the anterior surface:—
    - i. Gastric region smooth ... *A. affinis*.



- ii. Gastric region with a sharp tubercle or spine     ...     ...     ... *A. spinosus*.
- II. Carapace with a long post-ocular neck: dactyli of last pair of legs hardly curved:—
  - 1. Lobes of rostrum with a spinate carina: median tubercles of carapace low and blunt     ... *A. cadelli*.
  - 2. Lobes of rostrum with a smooth carina: median tubercles of carapace sharp and elevated *A. tenuicollis*.

*Achæus tenuicollis*, Miers.

*Achæus tenuicollis*, Miers 'Challenger' Brachyura, p. 9, Pl. I. fig. 3.

"The body is thinly clothed with short curled hairs; the limbs with similar hairs, interspersed among which are some longer ones. The carapace is subtriangulate, little longer than broad, with a neck-like constriction behind the orbits, and armed with spines as follows:—Three conical spines upon the gastric and another upon the cardiac region, two shorter conical spines or tubercles whereof the anterior is the smallest, on each branchial region, behind these one very small on the posterior margin of the carapace, and another on the sides of the branchial regions above the bases of the chelipedes; also a small spine upon the rounded, lateral, hepatic protuberance, and another behind this, on the pterygostomian region; there is also a strong spinule on the upper margin of the orbit, above the eye-peduncles. The lobes of the rostrum are short, and terminate each in a spine. The sternal surface of the body bears a few spinules. The post-abdomen of the male, is as usual, six-jointed (the two last joints having coalesced). The eye-peduncles are robust, with the cornæ protuberant; a small spinule exists on the inferior margin of the eye-peduncle, and another on the upper margin of the eye, near the distal extremity. The antennules are lodged in deep longitudinal fossettes; the very slender basal joint of the antennæ is joined with the front at its distal extremity and bears several small spinules on its inferior surface, the following joint is short, the next about as long as the basal joint, flagella slender; the ischium-joint of the outer maxillipedes is produced at its inner and distal angle which is rounded and bears several spinules on its outer surface, as does also the merus-joint which is rounded, not truncated, at the distal extremity where it bears the next joint. The chelipedes (in the male) are rather slender, and longer than the body; with the joints clothed with rather long hairs; ischium and merus-joints with a series of spinules on their antero- and postero-inferior faces, wrist about as long as palm, with a few spinules hardly discernible amid the hairs which clothe this joint,

palm slightly compressed, not dilated, armed with spinules on its upper and lower margins, fingers about as long as palm, and slightly incurved at the apices which are nearly destitute of hair; the ambulatory legs are very slender and elongated; the dactyli of the first three pairs are short and nearly straight, in the last pair only are they slightly falciform. Colour (in spirit) light yellowish-brown." (Miers).

A single specimen is included in the Museum collection: the locality is not quite certain, but it came most probably from the Andamāns.

*Achæus cadelli*, n. sp. Plate V. fig. 1.

In general form and proportions much resembling *Achæus lorina* (Ad. & White), from which it differs in having the legs even more slender, and the eye-stalks quite smooth.

The regions of the pyriform carapace are well demarcated, the hepatic regions being each produced to form a strong sharp tooth. There are three elevations, arranged in triangle, on the gastric region, and two, side by side, on the cardiac region.

The rostrum has the usual *Achæus*-form, but each lobe is dorsally carinate, the carina being spinate or serrate.

Behind the rostrum is a long constricted "neck," more pronounced even than that of *A. tenuicollis* and *brevirostris*.

The chelipeds are of the usual form. The legs are extremely long and slender, those of the second trunk segment being about five times the length of the carapace, rostrum included. The dactyli of the 4th and 5th pairs are hardly falciform. Length of carapace, 7 millim.: greatest breadth of carapace, 4 millim.: length of 2nd pair of trunk-legs, 36.5 millim.

*Loc.* Andamāns.

*Achæus spinosus*, Miers.

*Achæus spinosus*, Miers, Japanese and Korean Crustacea, in Proc. Zool. Soc., 1879, p. 25.

Carapace triangular, narrowed behind the eyes, and armed with six spines above, namely: one on the gastric, one—bilobed—on the cardiac, and two on each branchial region: there are also some spines or sharp tubercles on the ventrad aspect of the hepatic and branchial regions. The rostrum is small and bilobed. The eye-stalks are robust, and have a strong tubercle near the middle of the anterior surface. Chelipeds in the male robust, the arm and wrist granular above, the palm swollen, with about six spinules on the upper margin and a few granules on the lower margin near its base: fingers, in the male, acute

with a wide hiatus at base when closed, both with a strong tooth on their opposed margins near the base, and with the outer margins carinate. In the female the chelipeds differ only in being much less robust, and in having the fingers much more closely apposable and toothless. Ambulatory legs long and slender: the dactylus of the last pair strongly falcate.

[The basal antennal joint has one or two spines at its distal end, and the free portion of the antenna is much shorter than the carapace.]

Length of adult, 6 to 7 millim.

In the Museum collection, from the Persian Gulf. Ex coll. W. T. Blanford.

*Achæus lacertosus*, Stimpson.

*Achæus lacertosus*, Stimpson, Proc. Acad. Nat. Sci. Philad., 1857, p. 218.

*Achæus breviceps*, Haswell, Proc. Linn. Soc., N. S. Wales, Vol. IV. 1879, p. 433 (sec. Haswell).

*Achæus lacertosus* and *breviceps*, Haswell, Cat. Austr. Stalk and Sess. eyed Crust., p. 8.

*Achæus lacertosus* Miers, Zool. "Alert," pp. 181 and 188; and "Challenger" Brachyura, p. 8.

*Achæus lacertosus*, J. B. Henderson, Trans. Linn. Soc., Zool., 1893, p. 341.

Carapace triangular, with the regions fairly well delimited and the surface quite smooth beneath a slight pubescence: hepatic region with a horizontal laminar tooth. Rostrum as long as wide, bilobed.\* Antennæ filiform, the free portion longer than the carapace. Eye-stalks long, slender, smooth. Chelipeds much stouter than the other legs, the meropodite being the stoutest joint, and the hand being incurved and the fingers compressed. The ambulatory legs are long and slender, the first pair being more than three times the length of the carapace: the dactyli of the last two pairs are strongly falcate.

Length of adult about 6 millim.

In the Museum collection are numerous specimens from the Andamans, from Palk Straits, and from the Orissa Coast.

*Achæus affinis*, Miers.

*Achæus affinis*, Miers, Zoology of the 'Alert,' pp. 181 and 188, and "Challenger" Brachyura, p. 8.

*Achæus affinis*, de Man, Archiv. f. Naturges., LIII. 1887, p. 218.

*Achæus affinis*, Henderson, Trans. Linn. Soc., Zool. (2) V. 1893, p. 341.

*Achæus affinis*, Ortmann, Zool. Forsch. in Austr. and Malay Arch., Jena, 1894, p. 87.

"Carapace subtriangular and moderately convex, with the surface uneven, but the regions not very distinctly defined; the post-orbital

region is constricted. The rostrum is moderately prominent, the frontal lobes very small and subacute. On the cardiac region is a bilobated prominence, which is usually very much elevated; there is a small angulated prominence on the hepatic regions, and occasionally one or two granules on the branchial regions, which are not at all convex. Eye-peduncles with a blunt tubercle in the middle of their anterior margins. The merus-joints of the outer maxillipedes are narrowed and subacute at their distal ends, where they are articulated with the next joints. The chelipedes (in both sexes) are rather slender; margins of the arm, wrist, and palm usually with a few granules or spinules; merus somewhat trigonous; fingers as long as the palm, and somewhat incurved, with their inner margins denticulated, and having between them when closed (in the males) a small hiatus at base. The ambulatory legs are slender, filiform, and very much elongated, the second legs being, in an adult male, four times as long as the postfrontal portion of the carapace; the dactyli of the two posterior pairs only are distinctly falciform; both chelipedes and ambulatory legs are scantily clothed with long hairs. Length of carapace (including rostrum) of an adult male about 5 lines (10.5 millim.), breadth about 3 lines (6 millim.); length of second leg about 1 inch 8 lines (42 millim.); an adult female has the carapace relatively somewhat broader, length nearly  $5\frac{1}{2}$  lines (12 millim.), breadth 4 lines (8.5 millim.).

The bilobated prominence on the cardiac region and tuberculated eye-peduncles serve to distinguish this species." (Miers).

This species is included in the Indian Fauna on the authority of Professor Henderson: there are no specimens in the Indian Museum collection.

#### PARATYMOLUS, Miers.

*Paratymolus*, Miers, P. Z. S., 1879, p. 45.

*Paratymolus*, Haswell, Ann. Mag. Nat. Hist., 1880, Vol. V. p. 302; and Cat. Austr. Crust., p. 142.

*Paratymolus*, Ortmann, Zool. Jahrb. Syst., &c., VII. 1893-94, p. 84.

I agree with Ortmann in placing this genus among the *Acheus*-like Maiidæ: the position of the external genitalia of an ovigerous female in the Museum collection is conclusive.

Carapace elongate-subpentagonal, not depressed.

Eye-stalks long, slender, salient, non-retractile: no orbits or pre-ocular and post-ocular spines. Antennules longitudinally folded beneath the rostrum.

Antennæ long, exposed, dorsally, in the greater part of their extent: the basal joint slender, but so short as hardly to reach the front.

Rostrum short, emarginate, distinctly delimited from the carapace. Epistome short.

External maxillipeds with the merus narrower than the ischium, and bearing the flagellum at the antero-internal angle.

Legs not elongate: dactyli slender, straight.

*Paratymolus hastatus*, n. sp. Plate V. figs. 4, 4a.

Carapace somewhat elongate-pentagonal or ovoid, with the rostrum sharply demarcated, and with the regions undefined.

Gastric region with three sharp tubercles disposed in a triangle, base forwards: cardiac region with a single tubercle: branchial regions each surmounted by an oblique crest of 2 or 3, and with a lateral marginal row of 2 or 3, sharp tubercles: hepatic regions each with two sharp lateral teeth, the posterior of which is large. Rostrum short, emarginate, deeply and broadly grooved dorsally.

Eye-stalks long, laterally projecting, slightly moveable forwards but not retractile. Eyes tipped with two or three stiff setæ. No orbits, and nothing in the shape of orbital spines except a slight angular emargination of the base of the rostrum.

Antennæ as long as the post-orbital portion of the carapace, and visible, dorsally, from the base of the second joint of the peduncle: the basal joint, which alone is concealed, although slender is short, hardly reaching the front.

External maxillipeds with the merus broad, but not so broad as the ischium, and giving insertion to the palp at the antero-internal angle.

Trunk-legs with a few coarse stiff setæ: the 2nd pair, which are slightly the longest, are a little less than twice the length of the carapace without the rostrum.

Chelipeds characterized by the carpus, which has its antero-internal angle produced obliquely to form a great spike, the point of which reaches almost to the base of the fingers.

Length of carapace 6 millim. Breadth of carapace 4·5 millim. Length of 2nd pair of legs 10·5 millim.

An egg-laden female from the Andamans; in which I am satisfied that the genital orifices are not on the bases of the third pair of legs, but on the sternum.

#### PHYSACHÆUS, n. gen.

Closely allied to *Achæus*, from which it is distinguished chiefly by the form of the basal joint of the antennary peduncle, which is long and slender, and is fused near its distal end with the tip of the rostrum.

General form that of an *Achæus* with the pterygostomial and branchial regions so inflated as to push forwards the epistomial region to a plane almost at right angles with the antennary region.

Eyes small, slender, rigidly immovable,—in short undergoing degeneration. No orbits or orbital spines.

Rostrum very short, bifid, at tip, the point of each tooth being fused with the distal end of the (otherwise free) sub-cylindrical basal joint of the antennary peduncle. Antennæ of great length.

External maxillipeds with the merus rounded and slightly produced beyond the articulation—at the antero-internal angle—of the palp: the merus much narrower than the ischium. Legs long and slender, with long filamentous dactyli. Chelipeds short.

*Physachæus ctenurus*, n. sp. Plate III. figs. 2, 2 a-b.

Carapace sub-triangular, globosely inflated, with all the regions, except the cardiac, tumid and fairly well delimited, and with a strong post-ocular constriction, beneath which there is an almost vertical descent to the mouth.

The rostrum, which is small, consists of two narrow, slightly divergent, hollow teeth, to either apex of which the distal end of the otherwise perfectly free basal joint of the corresponding antennary peduncle is fused.

Two large erect procurved spines occur in the middle line of the carapace; one on the posterior part of the gastric region, the other behind the cardiac region: on either side of the former, but in a plane anterior to it, there may sometimes be a spinule.

In both sexes the abdomen is bluntly but strongly carinated down the middle line, the carina in the case of the male ending on the 6th tergum in a huge recurved spine: in the female instead of a spine there is a small tubercle, and the posterior edge of the sixth tergum bears a row of four spines.

The eye-stalks are very small, and are rigidly fixed at right angles to the rostrum: the corneæ are almost devoid of pigment. There are no orbits or orbital spines.

The antennæ are distinctly exposed from their base, and are half as long again as the entire carapace, between one-third and two-fifths of their extent being formed by the slender peduncle. The basal joint is slender and almost cylindrical: it is quite free from neighbouring parts, except at the distal end, which is fused with the tip of the rostrum. The flagella are fringed with long hairs.

The antennules are large, and fold longitudinally within the hollow teeth of the rostrum. Except in regard of the fingers, the chelipeds

have much the same form as, though slenderer proportions than, those of *Stenorhynchus*, but the merus is much more strongly and elegantly curved: the merus and carpus are moderately inflated, the former joint, like the ischium, having its lower edge more or less granulate: the palm is compressed, with the edges denticulate: the fingers are strongly compressed, and have the cutting edges accurately and completely appposable throughout, being denticulate near the tips only.

In the female the chelipeds have the same general form as in the male, but differ in having the lower edge of the ischium and merus strongly spinate. The legs are slender and filiform, about one-fourth of their length being contributed by the filamentous dactylus: those of the third trunk-segment are the longest, being about four times the length of the carapace, rostrum included, and more than two-and-a-half times the length of the chelipeds.

		Male.		Female.
Length of carapace	...	7.2 millim.	...	8.5 millim.
Breadth of carapace	...	6.0 "	...	7.0 "
Length of legs of 2nd trunk-segment		28.0 "	...	28.0 "
" " 3rd	" "	32.0 "	...	32.0 "

Numerous males and egg-laden females from the Andaman Sea, 240 to 375 fathoms.

The eggs are few in number and are singularly large, those from a female of the dimensions given above being over a millimetre in diameter.

*Physachæus tonsor*, n. sp. Plate III. fig. 3.

The female, which is the only sex represented in the collection, differs from the female of *Physachæus ctenurus* in the following particulars:—

(1) the gastric region of the carapace, instead of a single large spine, has several smooth tubercles; and the large spine behind the cardiac region is coarser, and is recurved instead of procurved: the post-ocular constriction is less marked:

(2) the abdominal carina ends in a spine, and the sixth tergum has its after edge perfectly smooth instead of quadrispinate:

(3) the eye-stalks are larger, and are compressed instead of cylindrical:

(4) the chelipeds are relatively stouter, being of much the same proportions as those of the male of *Physachæus ctenurus*: their merus is compressed and has its lower border very strongly and sharply carinated: the hands are much thinner and more compressed; the palm

having its lower edge, and the fingers their outside edges, sharply cristate:

(5) the legs of the second, not of the third, trunk-segment are the longest, and considerably so.

Length of carapace 11 millim. Breadth of carapace 9.5 millim. Length of legs of 2nd trunk-segment 47 millim., of 3rd trunk-segment 40 millim.

Two egg-laden females from the Andaman Sea, 271 fathoms.

The eggs, as in the preceding species, are large and few in number.

The above species represent an *Achæus* modified for life at a considerable depth. The branchial chambers, as is very commonly the case in deep-sea Malacostraca, are greatly inflated: the eyes have degenerated, and the antennæ—no doubt in compensation—have become remarkably lengthened: while the auditory tubercles also, it may be mentioned, are large and prominent.

#### GRYPACHÆUS, n. gen.

Intermediate between *Achæus* and *Echinoplax*.

Carapace triangular, spiny, separated from the frontal region by a post-ocular "neck." Rostrum spiny: composed of two short divergent spinelets, with a strong median deflexed (interantennular) spine, not visible from above. Eyes laterally projecting, movable, but not sufficiently retractile to be ever concealed. Small supra-ocular and post-ocular spines are present as part of the general spinature. Antennæ dorsally exposed from the basal joint of the peduncle, which joint is long slender cylindrical and spiny. External maxillipeds with the merus elongate, much narrower than the ischium, and not much broader than the carpopodite. Legs hairy and spiniferous. Abdomen six-jointed in ♀

*Grypachæus hyalinus* (Alcock & Anderson). Plate III. figs. 4, 4a.

*Achæus hyalinus*, Alcock & Anderson, J. A. S. B., Pt. ii. 1894, p. 205.

Carapace sub-triangular, thin, vitreous, spiny especially in its anterior half: the regions well delimited, and the post-ocular portion constricted to form a "neck." The rostrum, as seen from above, ends in two short spines, each of which has a spine at its base; but from in front or from below it shows a strong vertically deflexed (interantennular) spine.

The eyes are large; and the long eye-stalks, which bear two tubercles on their front surface, are movable backwards, and are exposed from



their base in all positions. The antennæ are visible, dorsally, from the end of the basal joint of the peduncle, which joint is long, slender, cylindrical and spiny.

The external maxillipeds are large, hairy, and almost pediform, owing to the narrowness of the merus and the coarseness of the palp.

The trunk-legs are hairy and spiny, the hairs on the 2nd and 3rd pairs being remarkably long, stiff, and closely and evenly set. The arm, wrist, and hand of the chelipeds—but especially the arm—are acutely spiny, as are also the edges of the meropodites of the legs,—the spinature of the front edge of the meropodites of the 2nd and 3rd pairs being particularly prominent. The fifth pair of legs are sub-chelate, the propodite having its proximal end strongly dilated to receive the folded-back dactylus: the apposed edge of the dactylus is minutely, that of the propodite sharply and conspicuously, spinate.

Length of carapace 14 millim. Breadth of carapace 9 millim. Greatest span (between extended 2nd pair of trunk-legs) 67 millim.

Loc. Off Trincomalee 28 fms. Females only.

#### ECHINOPLAX, Miers.

*Echinoplax*, Miers, "Challenger" Brachyura, p. 81.

Carapace sub-pyriform, longer than broad, and covered with very numerous closely-set spines and spinules: orbital margin spinose: spines of rostrum acute, divergent from their bases, and bearing several accessory spinules. Post-abdomen seven-jointed. Basal antennal joint slender, spinuliferous, and in contact with the front at the distal extremity: flagellum visible from above at the sides of the rostrum. Maxillipeds with the merus narrower than the ischium, and the palp coarse; merus truncated and not notched at the distal extremity, the antero-lateral angle not produced. Legs spinuliferous. Chelipeds in the female [as in the male] slender and feeble, with the palms not dilated. Ambulatory legs considerably elongated, with the penultimate joint not dilated; the dactyli nearly straight.

#### Key to the Indian Species of *Echinoplax*.

Carapace with the regions well defined: rostrum in the adult considerably less than half the length of the carapace:—

1. Carapace and abdominal terga closely covered  
with pungent acicular spines of equal size...*E. pungens*.
2. Carapace and abdominal terga finely granular,  
with a few definitely placed spines of conspic-  
uous size                   ...                   ...                   ... *E. rubida*.

*Echinoplax pungens*, Wood-Mason.

*Echinoplax pungens*, Wood-Mason, Ann. Mag. Nat. Hist., March, 1891, p. 259.

Carapace pyriform, convex, with the regions well delimited; densely covered, as are also the sterna, chelipeds, ambulatory legs, and external maxillipeds, with pungent acicular spines. The abdominal terga of the male and young female are also similarly spiny, but in the adult female they become only distantly and coarsely granular.

The rostrum consists of two slender curved divergent spines—less than one-third the length of the carapace proper—the outer and lower surfaces of which are extremely spiny.

The eye-stalks, which have the anterior surface closely spinulate, are retractile, but not to the extent of concealment: there is a strong post-ocular spine—to which, however, the retracted eye does not nearly reach—and numerous smaller spines along the supra-ocular and infra-ocular margins. The antennæ are visible from above, from the middle of the second joint of the peduncle: the peduncle is spiny, with all the joints very slender: the flagellum reaches a little beyond the tip of the rostrum.

The interantennular spine is large and deeply bifid.

The chelipeds, which are alike in form in both sexes—though relatively longer in the male—are not stouter than the ambulatory legs, and are rather longer than the carapace and rostrum.

The legs of the next pair are more than twice, and those of the third pair rather less than twice the length of the chelipeds, while the fourth and fifth pairs decrease considerably in length: the dactyli of all are densely covered with a brushwork of setæ.

	Male (adult).	Female (adult).
Length of carapace and rostrum	70 millim.	79 millim.
Greatest breadth of carapace	47 "	57 "
Length of cheliped ...	76 "	75 "
" " 2nd pair ...	158 "	191 "

Andaman Sea, 130–250 fathoms.

A figure of this fine species has been drawn for "Illustrations of the Zoology of the 'Investigator'" for 1896.

*Echinoplax rubida*, n. sp.

Differs from *Echinoplax pungens*, specimens of the same sex, and of approximately the same size being compared, in the following particulars:—

1. The carapace, instead of being everywhere covered with pun-

gent acicular spines of uniform size, is finely granular, with certain definitely placed distant thornlike spines of conspicuous magnitude, namely:—four in triangle on the gastric region, two side by side on the cardiac region, two side by side on the intestinal region, three on each hepatic region, and three on each branchial region: besides these there are some smaller spines on the lateral aspect of the pterygostomian and branchial regions:

2. The rostral spines are less divergent, and have elegantly curved tips:

3. The abdominal terga (of the young female), instead of being everywhere closely covered with pungent spines, are merely finely and distantly granular, with a single large spine on the first tergum, and a pair of smaller spines on the second, in the middle line:

4. The legs are much less spiny, the propodites of the ambulatory legs being fringed with stiff bristles instead of spines:

5. The colour differs, being, in spirit specimens, a warm brown, instead of a pale yellow.

It differs from *Echinoplax moseleyi*, Miers, judging from the figures and description, in the following particulars:—

1. The regions of the carapace are well delimited by sharp cut grooves:

2. The rostral spines are considerably less than half the length of the carapace proper:

3. The armature is altogether different, the large stout spines of the present species standing out on a finely granular carapace, and the abdominal terga being distantly granular.

Total length of carapace 35 millim., breadth of carapace 21 millim., greatest span (2nd pair of trunk-legs) 150 millim.

*Loc.* Andaman Sea, 90 to 177 fathoms.

#### PLATYMAIA, Miers.

*Platymaia*, Miers, 'Challenger' Brachyura, p. 12.

Carapace sub-orbicular. Rostrum short, tridentate owing to the size and projection of the interantennular septum. No pre-ocular spine; but a post-ocular spine against which the eye is retractile, but which affords no concealment to the eye. Epistome extremely narrow. Eyes large, with short eye-stalks. Basal antennal joint short, cylindrical, and perfectly free: the flagellum and part of the peduncle visible from above.

External maxillipeds with the meropodite narrow, and bearing the next joint at its summit. Chelipeds in the male long, with a long in-

flated club-shaped palm: in the female very short and slender. Ambulatory legs long, with remarkably thin compressed joints: some of the legs spiny.

Abdomen in both sexes with all the segments separate.

This genus appears to be very closely related to *Macrocheira*.

*Platymaia wyville-thomsoni*, Miers.

*Platymaia wyville-thomsoni*, Miers, 'Challenger' Brachyura, p. 13, pl. ii. fig. 1.

*Platymaia wyville-thomsoni*, Wood-Mason and Alcock, Ann. Mag. Nat. Hist., March, 1891, p. 258, and May, 1894, p. 401.

Carapace transversely sub-circular with the cervical groove well defined: its surface ranging from spinate (in the young) to nearly smooth (in old adults). The rostrum, which is so short as not to break beyond the general outline, consists of three stout spines of equal size, the middle one being the horizontally projecting interantennular spine.

The hepatic region of the carapace bears (in the adult) a nearly vertically disposed row of three spines, against the upper one of which the eye is retractile.

The eye-stalks are short, and the eyes large and oval. The antennæ are about one-third the length of the carapace, and are plainly visible, in almost the whole of their extent, from above: the joints of the peduncle are short slender and cylindrical, the basal joint being perfectly free.

The external maxillipeds have the meropodite narrow (about half the breadth of the ischiopodite) and giving attachment to the coarse palp at the summit: both meropodite and ischiopodite are spiny.

The chelipeds vary considerably according to sex: in both sexes they are spiny up to the base of the fingers; but whereas in the female and young male they are much slenderer than any of the legs and are not longer than the carapace, in the adult male they are from two to three times the length of the carapace and are much stouter than any of the legs—especially as regards the palm, which is swollen and club-shaped. The 2nd to 5th pairs of legs are long and slender, with the joints thin and compressed, the propodites being blade-like. The 2nd pair, which are from  $3\frac{1}{4}$  (female) to  $5\frac{1}{2}$  (male) times the length of the carapace, are remarkable for their propodite and dactylus, the front edge of which bears a double comb of enormous spines, the posterior edge also being spinulate: both edges of the merus and carpus also are distantly spinulate. The 3rd and 4th pairs have the front edge of the merus distantly spinulate, and they, as well as the 5th pair, have the front edge of the razor-like merus closely fringed with long stiff hairs.

The abdomen in both sexes is seven-jointed, the abdominal terga, like the thoracic sterna, bearing a few spines or tubercles. The epimeral plates corresponding to the third and fourth trunk legs are also spinate.

Andaman Sea, 130-405 fathoms.

A large male of this fine species have been figured for "Illustrations of the Zoology of the 'Investigator'" for 1896.

*Note on some obvious growth-changes in* *Platymaia wyville-thomsoni*.

In very young specimens (carapace less than half an inch in diameter) the whole carapace is closely and sharply spiny.

In larger specimens (carapace about three-quarters of an inch in diameter) the carapace has become closely and finely granular, with the spines persistent only in definite situations, somewhat as in Miers' figure and description (*loc. cit.*)

In larger specimens (carapace two and a half inches in diameter) the carapace has become coarsely and bluntly granular, without any spines, except a few quite anteriorly in the neighbourhood of the hepatic region.

In the largest specimens (carapace three to nearly four inches in diameter) the carapace is in places quite smooth, the only spines present being two external to the eye, and one on the front margin of the hepatic region.

In contrast with the carapace, the spines on the abdominal sterna of the male show no signs of effacement with age.

The colours also vary with age. In young males the carapace is red, with or without white points, and the legs are red and white in alternate bands. In the adult the colour is uniform.

#### ONCINOPUS, de Haan.

*Oncinopus*, de Haan, Fauna Japonica, Crust., p. 87.

*Oncinopus*, Miers, Journ. Linn. Soc., Zool., Vol. XIV. 1879, p. 645; and 'Challenger' Brachyura, p. 20.

"Carapace semi-membranaceous, elongate,\* narrow-triangular and depressed. Rostrum very short, composed of two vertically compressed laminiform lobes: no præ- or post-ocular spines. Post-abdomen in both sexes distinctly seven-jointed. Eyes slender and projecting laterally. Antennæ with the basal joint very short and slender, and not attaining the front, the flagella exposed and visible at the sides of the rostrum. Merus of the exterior maxillipedes elongated, and articulated with the

next joint at its summit. Chelipeds in the male rather small, with the palm turgid, and the fingers having between them, when closed, an interspace at the base. Ambulatory legs slender and somewhat elongated, with the penultimate joints of the first and second pairs dilated, compressed, and ciliated on the posterior margin; the dactyli in all slightly arcuated and retractile against the penultimate joints."

*Oncinopus aranea*, de Haan.

*Inachus (Oncinopus) aranea*, de H., Faun. Japon. Crust., p. 100, pl. xxix. fig. 2.

*Oncinopus aranea*, Adams and White, Zool. 'Samarang,' Crust., p. 3.

*Oncinopus neptunus*, Adams and White, Zool. 'Samarang,' Crust., p. 1, pl. ii.

fig. 1.

*Oncinopus subpellucidus*, Stimpson, Proc. Acad. Nat. Sci. Philad., 1857, p. 221.

*Oncinopus angulatus*, Haswell, Proc. Linn. Soc., N. S. Wales, IV. 1879, p. 433.

*Oncinopus subpellucidus*, Haswell, Cat. Austr. Crust., p. 5.

*Oncinopus aranea*, Miers, Zool. 'Alert,' pp. 182 and 190; and 'Challenger'

Brachyura, p. 20.

*Oncinopus neptunus*, Walker, Journ. Linn. Soc., Zool., Vol. XX. 1890, p. 109.

*Oncinopus aranea*, Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 341.

*Oncinopus aranea*, Ortmann, Zool. Jahrb., Syst. etc., VII. 1893, p. 37.

*Oncinopus neptunus*, Alcock and Anderson, J. A. S. B., Pt. ii. 1894, p. 199.

Carapace elongate-triangular, thin and semi-membranous, and, as well as all the appendages, tomentose. Rostrum short, bilobed.

Eyes small, retractile beneath the edge of the carapace: no orbits or protective spines.

Antennæ extremely short, reaching only just beyond the tip of the rostrum: the basal joint short and free.

Chelipeds in the female and young male slenderer than the next legs and not quite equal in length to the carapace; in the adult male about as stout as the next legs, with an inflated almost globose palm, and a little longer than the carapace.

The 2nd and 3rd pair of legs differ very markedly from the 4th and 5th pair. The 2nd and 3rd pair are long and stout, with a comparatively short carpopodite, with a long broad propodite, and with a comparatively slightly curved dactylus—all these joints being remarkably setaceous. The 4th and 5th pair, on the other hand, are slender and comparatively short, with a long slender carpopodite and with a short propodite which with the strongly recurved dactylus forms a sub-chela—all these joints being merely tomentose. The 5th pair of legs is also remarkable for its sub-dorsal position.

Length of carapace of an adult, 14 to 15 millim.

Specimens in the Museum collection from the Laccadives, Maldives, Ceylon, Andamans and Malay Peninsula, up to 32 fms.

## CAMPOSCIA, Latreille.

[*Camposcia*, Latreille, Cuvier Regne Animal (2) IV. p. 60.]

*Camposcia*, Milne-Edwards, Hist. Nat. Crust. I. 282.

*Camposcia*, de Haan, Fauna Japonica, Crust., p. 87.

*Camposcia*, Miers, Journ. Linn. Soc., Zool., Vol. XIV. 1879, p. 644.

Carapace pyriform. Rostrum broad, exceedingly short—hardly surpassing the level of attachment of the eyes—emarginate, slightly deflexed.

Eye-stalks long, recurved, retractile towards the sides of the carapace: a post-ocular tooth, not however affording any concealment to the eye. Antennular fossæ coalescent to form a single chamber. Antennæ moderately long, almost entirely exposed to dorsal view, the free joints of the peduncle flattened.

External maxillipeds with the merus narrower than the ischium, and giving attachment to the next joint at the summit. Chelipeds in both sexes slender—but most so in the female—and short. Some of the ambulatory legs long.

The abdomen in both sexes has all seven joints distinct, and is as broad in the adult male as it is in the adult female—covering almost the whole sternum.

*Camposcia retusa*, Latr.

[*Camposcia retusa*, Latreille, Cuvier Regne Animal (2) IV. p. 60.]

[*Camposcia retusa*, Guérin, Icon. Regn. Anim. Crust., pl. ix. fig. 1.]

*Camposcia retusa*, Latr. Milne-Edwards, Hist. Nat. Crust. I. 283, pl. xv. figs. 15 and 16.

*Camposcia retusa*, Cuvier, Regne Animal, Crust., pl. xxxii. fig. 1.

*Camposcia retusa*, Adams and White, Zool. 'Samarang,' Crust., p. 6.

*Camposcia retusa*, Bleeker, Recherches Crust. de l'Ind. Archipel., p. 7.

*Camposcia retusa*, Stimpson, Proc. Acad. Nat. Sci. Philad., 1857, p. 218.

*Camposcia retusa*, A. Milne-Edwards, Nouv. Archiv. du Mus., VIII. 1872, p. 255.

*Camposcia retusa*, Brocchi, Ann. Sci. Nat. (6) II. 1875, Art. 2, p. 89, pl. xviii.

fig. 156 (male appendages).

*Camposcia retusa*, Hilgendorf, Monatsber. Akad. Berl., 1878, p. 784.

*Camposcia retusa*, Haswell, Proc. Linn. Soc., N. S. Wales, IV. 1879, p. 433; and Cat. Austr. Stalk and Sessile-eyed Crust., p. 4.

*Camposcia retusa*, E. Nauck, Zeits. Wiss. Zool., xxxiv. 1880, p. 38 (gastric teeth).

*Camposcia retusa*, Miers, Zool. 'Alert,' pp. 181, 189, 516, and 520.

*Camposcia retusa*, De Man, Archiv. f. Naturgesch. LIII. 1887, Bd. i. p. 219.

*Camposcia retusa*, C. W. S. Aurivillius, Kongl. Sv. Vet. Akad. Handl., XXIII. 1888-89, No. 4, p. 35.

*Camposcia retusa*, A. Ortmann, Zool. Jahrb., Syst., etc., VII. 1893, p. 35.

[*Camposcia retusa*, F. Müller, Verh. Ges. Basel, VIII. p. 473.]

Carapace pyriform, thin, but well calcified. The whole body and

most of the appendages thickly setaceous, and densely encrusted with sponges, zoophytes, algæ, etc. Rostrum broad, extremely short, somewhat deflexed, slightly emarginate.

Eye-stalks long, recurved, retractile to the sides of the carapace, and towards a slender acute post-ocular spine. Owing to the imperfection of the rostrum the interantennular spine is not developed, so that both the antennules fold into a common chamber.

The antennæ, which are completely exposed from the base of the 2nd joint, have the basal joint long and slender, and the free joints of the peduncle flat and densely setaceous.

The hairy external maxillipeds have the antero-internal angle of the ischium produced into a long narrow lobe, parallel to the narrow meropodite.

The chelipeds in both sexes are slender and are about equal in length to the carapace: in the male they are stouter than in the female, and also differ in having the palms inflated: the fingers in both sexes are closely apposable and are toothed throughout.

The other trunk-legs increase in length from the 2nd pair (which are a little longer than the chelipeds) to the 4th pair (which are twice as long as the chelipeds): the 5th pair, again, being only as long as the 3rd pair.

The abdomen in the adults of both sexes is broad and sub-circular, almost entirely covering the sternum, and consists of seven separate segments.

In the Museum collection are adult males and egg-laden females from the Andamans, Cocos, Ceylon and Samoa—the last being from the collection of the Museum Godeffroy.

## Alliance II. INACHOIDA.

### INACHOIDES, Edw. & Lucas.

*Inachoides*, Milne-Edwards and Lucas, in D'Orbigny Voy. Amer. Merid., Crust. pp. 4 & 5.

*Inachoides*, Miers, Journ. Linn. Soc., Zool., Vol. XIV. p. 646.

*Inachoides*, A. Milne-Edwards, Miss. Sci. Mex., etc., Crust., etc., I. p. 198.

Carapace pyriform much narrowed in front, inflated behind, the regions well delimited. Rostrum simple. Eyes not, or slightly, retractile towards the sides of the carapace; never, in any position, concealed. Pre-ocular and post-ocular spines distinct—especially the latter.

Basal antennal joint long and slender: its antero-external angle visible from above, on either side of the rostrum, as an acute spine:



the rest of the antennal peduncle, and the flagellum, completely exposed from above.

Epistome broad. External maxillipeds with the merus as broad as the ischium, completely closing the mouth.

Chelipeds in the male rather longer than any of the other legs, and with a long somewhat inflated palm. Ambulatory legs of moderate length, slender, and ending in a styliform dactylus which in some cases is spinulate along the posterior border.

Abdomen of the male composed of seven distinct segments, that of the female of five.

*Inachoides dolichorhynchus*, Alcock & Anderson. Plate IV. figs. 1, 1a.

*Inachoides dolichorhynchus*, Alcock and Anderson: Journ. As. Soc., Bengal, Pt. ii. 1894, p. 206.

Carapace elongate-triangular. Rostrum as long as the carapace, simple, spiny, acute. The regions of the carapace are well defined, and are distantly spiny, the following spines being the most conspicuous:— (1) on each side a supra-ocular, a post-ocular (hepatic), and four branchial; (2) in the middle line, a gastric, a cardiac, and an intestinal.

The eyes, though to a certain extent retractile towards the sides of the carapace, are in all positions completely exposed.

The antennæ, which are exposed from the end of the basal joint, are long—more than three-fourths the length of the carapace: their basal joint is long, slender, flattened and fused with the neighbouring parts, and has its antero-external angle produced into an acute spine: the second and third joints are knobbed distally.

The chelipeds are long—one-fourth longer than the carapace and rostrum combined: their palm, which forms about two-fifths of their total extent and is nearly three times the length of the fingers, is broadened and moderately inflated. The 2nd pair of trunk-legs are about equal in length to the chelipeds, but the 4th and 5th pairs are not much more than half that length.

Length of carapace and rostrum 17·5 millim.; greatest breadth 8 millim.; greatest span 54 millim.

Off Madras Coast.

#### ENCEPHALOIDES, Wood-Mason.

Nearly related to *Inachoides*.

Carapace, owing to the remarkable inflation of the branchial regions, heart-shaped and posteriorly as broad as long (rostrum included): the branchial regions meeting across the carapace in the middle line. Ro-

trum simple, shaped like the beak of a bird. Eyes retractile against the sides of the carapace: a small pre-ocular and post-ocular spine, but no definite orbit.

Basal antennal joint slender throughout: the antennæ visible, dorsally, from the base of the second joint.

Merus of the external maxillipeds produced antero-externally to form a foliaceous lobe which covers the greatly produced efferent branchial orifice.

Abdomen in the male seven-jointed: in the female the fourth, fifth and sixth segments, though distinctly recognizable, are firmly fused together.

Chelipeds in both sexes slender. Legs long and slender.

Only eight branchiæ on either side.

*Encephaloides armstrongi*, Wood-Mason.

*Encephaloides armstrongi*, Wood-Mason, Ann. Mag. Nat. Hist., March, 1891 p. 259.

Carapace heartshaped: its greatest breadth is equal to its length with the rostrum: its surface in the adult is nodular or pustular, in the young coarsely spiny. The gastric and hepatic regions are well-defined; but the cardiac and intestinal regions are entirely concealed by the branchial regions, which rise up like a pair of mammæ, and meet, but without any fusion of walls, down the middle line.

The rostrum, which is shaped exactly like the beak of a bird, is about one-fourth the length of the carapace proper, and has a finely serrated edge.

In the male the abdomen is distinctly seven-jointed; but in the female the fourth, fifth and sixth segments are immovably sutured together.

The eyes which are small, slender, and unpigmented, are retractile against the side of the carapace: there is a very narrow supra-orbital cave ending anteriorly in a minute tooth, and there is a small post-ocular spinule.

On the dorsal aspect the antennæ are plainly visible on either side of the rostrum, from the base of the 2nd joint of the peduncle: the flagella, which are of hairlike tenuity, hardly surpass the tip of the rostrum.

Owing to the prolongation of the efferent branchial canal, the front edge of the buccal frame is V-shaped, and the merus of the external maxillipeds ear-shaped.

The trunk-legs recall those of *Egeria*, being all long, slender, cylindrical, and quite devoid of hairs or spines: the chelipeds are short, and are not stouter than the ambulatory legs.

For proportions, see Ann. Mag. Nat. Hist., March, 1891, p. 260.

#### APOCREMNUS, A. Milne-Edwards.

*Apocremnus*, A. Milne-Edwards, Miss. Sci. Mex., etc., Crust., etc., I. p. 184.

*Apocremnus*, Miers, 'Challenger' Brachyura, p. 17.

Carapace triangular or pyriform, much narrowed in front, inflated behind. Rostrum bifid. Eyes imperfectly retractile: a strong supra-ocular, but no post-ocular spine [a distant hepatic spine must not be mistaken for a post-ocular spine]. Basal antennal joint narrow, its antero-external angle forming a strong spine visible from above on either side of the rostrum: the free joints of the peduncle and the flagellum exposed to dorsal view. Epistome broad. External maxillipeds with the merus at least as broad as the ischium, quite closing the mouth-frame. Chelipeds not much enlarged: the other legs short and slender, with slender dactyli capable of some flexion on the penultimate joint. Abdomen in the male six jointed—(in the female four (♀) jointed).

The genus *Apocremnus* has never yet been reported from Eastern Seas. It was first described from the Florida coast, and was afterwards reported by the 'Challenger' from Fernando Noronha (an island in the South Atlantic, off the coast of Brazil). There is nothing unprecedented therefore in its occurrence in deepish water in the Indian Ocean.

#### *Apocremnus indicus*, n. sp. Plate IV. figs. 2, 2a.

Carapace pyriform, inflated in the branchial, constricted in the post-ocular region, and armed with six long knob-headed spines, as follows:—one, semi-erect, above the root of either eye-stalk; one in the middle of the cardiac region, flanked on either side by one in the middle of each branchial region; one in the middle line on the posterior border. There are, in addition, on either side, two sharp spines, one above the other, near the middle of the hepatic region, and far from the eye.

The rostrum is formed of two short, slightly divergent, knob-headed spines. On either side of its base are seen the antennæ and a large spine formed by the antero-external angle of the basal antennal joint.

The constituent segments of the sternum are sharply granular, and are separated from one another by deep grooves.

The eye-stalks are of moderate length, salient, and almost immovable.

The buccal orifice is large, and the external maxillipeds are ornamented with lines of fine sharp-cut granulation: their merus is as broad as the ischium, and is excavated near the middle for the insertion of the palp. The chelipeds, in the male, are somewhat longer than the carapace and rostrum: their ischium, merus, and carpus are ornamented with lines of fine sharp granulation: the palms are elongate and compressed, with the edges carinate: the fingers, which are less than half the length of the palm, are compressed and curved.

The ambulatory legs, which decrease in length gradually, have their bases and meropodites granular, and the dactyli very slender.

The length of the carapace of the largest specimen—a male—is 9 millim., of an egg-laden female 6 millim.

From off the Andamans at about 100 fathoms, and off Ceylon at 32 to 34 fathoms.

#### COLLODES, Stimpson.

*Collodes*, Stimpson, Ann. Lyc. Nat. Hist., New York, Vol. VII. 1862, p. 193.

*Collodes*, Miers, Journ. Linn. Soc., Zool., Vol. XIV. 1879, p. 645.

Carapace ovate-triangular. Rostrum short, bifid, with the lobes approximate. Eyes of moderate length, retractile against a strong post-ocular process which affords no concealment. Basal antennal joint narrow, a little curved, anteriorly bidentate, one tooth placed behind the other; mobile part of the antennæ exposed. External maxillipeds with the merus as broad as the ischium, completely covering the mouth. Chelipeds of moderate size. Ambulatory legs short, prehensile, with slender dactyli which in length are equal to their propodites, and are retractile against the latter. Abdomen of the female consisting of five segments.

#### *Collodes malabaricus*, n. sp. Plate V. fig. 3.

Carapace ovate-triangular, with the gastric and cardiac regions distinct and elevated. Rostrum short, emarginate. Pre-ocular spine large and coarse, post-ocular spine very prominent. A tubercle on the cardiac region, and a large epibranchial spine on either side of it.

Basal antennal joint narrow throughout, and bearing two spines anteriorly—one at the antero-external angle, visible from above, and comparable in size to one of the rostral teeth—and one behind this, immediately in front of the base of the eye-stalk. Eyes slender and

retractile towards the post-ocular tooth, which, however, affords no concealment.

Chelipeds (in the female) hardly stouter than the ambulatory legs, which are short, with prehensile dactyli.

Two ovigerous females, the larger of which is 4 millim. long, from off the Malabar Coast, 26 to 31 fathoms.

The genus *Collodes* has hitherto been known only as a tropical American genus. It has been found on both sides of Central America so that its occurrence in Indian waters is not without precedent.

### Sub-family II. ACANTHONYCHINÆ.

Eyes without true orbits: eye-stalks little movable, either short and more or less concealed beneath a forwardly-directed supra-ocular spine, or obsolescent and almost or completely sunk either in the sides of a huge beak-like rostrum, or between low pre-ocular and post-ocular excrescences (*Sphenocarcinus*): a distinct post-ocular spine, which is not cupped, may be present (*Pugettia*). Basal antennal joint truncate-triangular.

External maxillipeds with the merus as broad as the ischium, and with the (small) palp arising from the antero-internal angle of the merus.

Dactyli of the ambulatory legs prehensile or sub-chelate, in the former case the last three pairs of legs are often disproportionately short compared with the second pair. Rostrum either simple or two-spined.

#### Key to the Indian genera.

- |  |   |  |  |   |                 |
|--|---|--|--|---|-----------------|
| 1. Rostrum of huge size; simple, or bifid at tip; not flanked on either side by salient supra-ocular spines. | { | 1. Eye-stalks almost obsolete, completely sunk, and almost or quite immovable: carapace smooth or tuberculate: no post-ocular process.                   | {  | i. Carapace and rostrum sub-cylindrical, the latter bifid at tip..... | XENOCARCINUS.   |
|  |   |  | ii. Carapace depressed, elongate-triangular: rostrum laterally compressed, not bifid at tip..... | SIMOCARCINUS.   |                 |
|  | { | 2. Eye-stalks short, sunken but movable between low smooth pre-ocular and post-ocular excrescences: carapace with huge symmetrical pedicled tablets..... |  |   | SPHENOCARCINUS. |

- II. Rostrum flanked on either side by salient supra-ocular spines; either long and simple, or consisting of two spines of moderate length: no post-ocular process.
1. Carapace elongate-triangular, rostrum elongate, simple: ambulatory legs not subchelate.
- i. Rostrum laterally compressed, supra-ocular spines small: eye-stalks so short and deeply sunken as to hardly reach to the sides of the carapace; carapace of the female with large foliaceous lateral lobes..... HUENIA.
- ii. Rostrum horizontally compressed, supra-ocular spines large: eye-stalks short, but reaching beyond the sides of the carapace: carapace of the female without foliaceous lobes..... MENÆTHIUS.
2. Carapace broad, sub-quadrangular: rostrum short and deeply bifid, ambulatory legs subchelate..... ACANTHONYX.

### XENOCARCINUS, White.

*Xenocarcinus*, White, Jukes' Voyage H. M. S. 'Fly,' Vol. II. p. 335.

*Huenioides*, A. Milne-Edwards, Ann. Soc. Entomol. France (4) V. 1865, p. 144.

*Xenocarcinus*, Miers, Journ. Linn. Soc., Zool., Vol. XIV. 1879, p. 648, pl. xii.

fig. 5.

Carapace ovate-subcylindrical, tapering to a long thick subcylindrical rostrum, or beak, the tip of which is emarginate or bifid.

Eyes short, completely sunken in the sides of the rostrum, almost immovable: no præ-ocular or post-ocular spines.

Antennæ with the basal joint triangular, and with the short mobile portion hidden beneath the rostrum.

External maxillipeds with the merus as broad as the ischium and giving attachment to the palp at its antero-internal angle.

Chelipeds not much shorter or stouter than the 2nd and 3rd pairs of legs: 4th and 5th pairs of legs short: all with the dactyli short, stout, curved, and sharply toothed along the posterior surface.

Abdomen of the female four-jointed, the 3rd—6th segments being fused together.

*Xenocarcinus tuberculatus*, White.

*Xenocarcinus tuberculatus*, White, P. Z. S., 1847, p. 119, and Ann. Mag. Nat. Hist. (2) I., 1848, p. 221, and in Jukes' Voyage H. M. S. 'Fly,' Vol. II. p. 336.

*Xenocarcinus tuberculatus*, Hess, Archiv. f. Naturges. XXXI. i. 1865, pp. 131 and 171.

*Xenocarcinus tuberculatus*, A. Milne-Edwards, Nouv. Archiv. du Mus. VIII. 1872, p. 253, pl. xii. fig. 1.

*Xenocarcinus tuberculatus*, Miers, Zool. 'Erebus' and 'Terror,' Crust., p. 1, pl. ii. fig. 1, 1e.

*Xenocarcinus tuberculatus*, Haswell, P. L. S., N. S. Wales, Vol. IV. 1879, p. 436, and Cat. Austr. Crust., p. 8.

*Xenocarcinus tuberculatus*, Ortmann, Zool. Jahrb. Syst., etc., VII. 1893, p. 40.

Carapace elongate ovate-subcylindrical with the regions ill defined and the surface more or less tuberculated. [Typically the tubercles fall into distinct transverse rows]. The rostrum has the form of a long coarse cylindrical beak, the apex of which is bifid, and the surface densely covered with velvety hairs.

The eyes are completely and almost immovably sunk in the sides of the rostrum.

The antennary flagella are much shorter than, and are completely hidden by, the rostrum.

The chelipeds and ambulatory legs are short and nodular, the latter having curved strongly-toothed prehensile dactyli. The chelipeds are hardly stouter, and are not much shorter, than the 2nd pair of legs, which again are much longer than the 3rd to 5th pair. The colours described by White are "two or three waved longitudinal red lines on the posterior half of the carapace, the inner line continued before the eyes." By A. Milne-Edwards the colours of the carapace and legs are said to be reddish stained with yellow.

In a good spirit specimen the abdomen carapace and beak are dull reddish brown, with a broad yellow stripe extending from the base of the beak to the tip of the abdomen, and on either side of the carapace a narrow sinuous yellow line; and the trunk-legs are yellow, more or less banded and striped with dull brown.

In the Museum collection are two females, one from Ceylon (34 fathoms), the other from the Andamans. The one from Ceylon, which is an egg-laden adult 15 millim. long, resembles as to its carapace and rostrum, but not as to its legs, the figure in the Zoology of the 'Erebus' and 'Terror'; and as to its legs, but not as to its carapace and rostrum, the figure in Archiv. du Mus. tom. VIII. 1872. The other, from the Andamans, which is not adult, exactly resembles, as to its carapace, but not as to its legs, the last cited figure.

## SPHENOCARCINUS, A. Milne-Edwards.

*Sphenocarcinus*, A. Milne-Edwards, Miss. Sci. Mex., Crust., I., p. 135.

*Sphenocarcinus*, Miers, Journ. Linn. Soc., Zool., Vol. XIV. 1879, p. 663; and 'Challenger' Brachyura, p. 34.

Carapace elongate sub-pentagonal, broad behind, tapering in front to a long rostrum formed of two spines (fused together to near the tip). The surface of the carapace is symmetrically and deeply honey-combed by broad deep channels which leave symmetrical tubercles with overhanging edges between them.

There are no true pre-ocular and post-ocular spines, but the eye is deeply sunk between two low smooth excrescences which are pre-ocular and post-ocular in position.

The basal antennal joint is truncate-triangular, and the antennary flagella are completely hidden beneath the rostrum. The epistome is long and narrow. The external maxillipeds have the merus as broad as the ischium, somewhat dilated at the antero-external angle, and somewhat excavated at the antero-internal angle for the insertion of the small palp. The chelipeds are not much stouter, and not much shorter than the next pair of legs, which are the longest: the dactyli of the legs, though stout recurved and prehensile, are not toothed along the posterior edge. Abdomen, in both sexes, seven-jointed.

*Oxypleurodon* Miers ('Challenger' Brachyura, p. 38) differs from *Sphenocarcinus* only in the form of the rostrum, the spines of which are divergent instead of convergent and more or less fused. I much suspect the generic value of this character. If, however, the two forms be identical, then *Sphenocarcinus* would have to be removed to the next sub-family, in which case the sub-family Acanthonychinæ would be perfectly homogeneous.

*Sphenocarcinus cuneus* (Wood-Mason).

*Oxypleurodon cuneus*, Wood-Mason, Ann. Mag. Nat. Hist., (6) VII. 1891, p. 261.

Carapace elongate sub-pentagonal, narrowing to a long tapering cylindrical rostrum, which, in the male, is longer than the carapace and only emarginate at the extreme tip, but, in the female, is shorter than the carapace and distinctly bifid at the end.

The carapace is symmetrically honey-combed by deep channels, which leave between them great symmetrically undermined islets, as follows:—one, very elongate-oval, on the gastric region; one, triangular, on the cardiac region; one, somewhat semilunar with one horn



much produced laterally, on each branchial region; and one, Cupid's bow-shaped, along the posterior border. Besides these there are some smaller islet-like excrescences, namely, on each side, a supra-ocular, post-ocular, hepatic, and branchial.

Between the supra and post-ocular excrescences, are set the small squat little-movable eyes.

Of the trunk-legs, the 2nd pair (*i.e.*, first ambulatory legs) are the longest, being very slightly longer than the chelipeds, and considerably shorter than the carapace measured with the rostrum, but much longer than any of the last 3 pairs of legs.

In the female all the long joints, except the dactyli, and in the male all except the dactyli and propodites, are strongly carinated dorsally.

The chelipeds are hardly stouter than the next pair of legs, except as regards the palm in the male, which is broadened and somewhat inflated. In neither sex are the short white polished fingers appposable throughout.

		Male.		Female.	
Length of carapace and rostrum	...	19·	millim.	...	18·5 millim
Greatest breadth of carapace	...	12·	"	...	13· "
Length of rostrum alone	...	10·5	"	...	8·7 "
" of 2nd pair of trunk-legs	...	15·5	"	...	15· "

*Loc.* Audaman Sea, 161 to 250 fathoms.

This extremely elegant species has been figured for next year's issue of "Illustrations of the Zoology of the 'Investigator.'"

#### HUENIA, de Haan.

*Huenia*, de Haan, Faun. Japon. Crust., p. 83

*Huenia*, Miers, Journ. Linn. Soc., Zool., Vol. XIV. 1879, p. 648; and 'Challenger' Brachyura, p. 34.

Carapace depressed, elongate-triangular in the male,\* with the lateral epibranchial angles produced; sub-quadrangular in the female, with two large foliaceous lobes (epibranchial and hepatic) on either side: a small pre-ocular, but no post-ocular spine. Rostrum simple, acute, vertically deep, laterally compressed. Abdomen in the male seven-jointed; in the female five-jointed; with the fourth to the sixth joints coalescent.

Eyes very small and almost immobile.

\* A small hepatic lobe is sometimes present in the male also, on either side.

Basal antennal joint somewhat enlarged, and coalescent at its distal extremity with the front; beneath which the flagella are inserted out of sight in a dorsal view.

The external maxillipeds are small, the merus distally truncated, and bearing the palp at its antero-internal angle. Chelipeds in the male moderately developed, with the palms compressed and cristate above, the fingers somewhat excavated at the tips, and not appposable throughout their extent. Ambulatory legs short—the longest pair not much longer than the chelipeds, dactyli short, stout, strongly recurved, and more or less toothed along the posterior margin.

*Huenia proteus*, de Haan.

*Maja* (*Huenia*) *proteus*, de Haan, Faun. Japon. Crust., p. 95, pl. xxiii. figs. 4–6.

*Huenia proteus*, Adams and White, 'Samarang' Crustacea, p. 21, pl. iv. figs. 4–7, and p. 22, pl. iv. fig. 5.

*Huenia proteus*, Haswell, Proc. L. S., N. S. Wales, Vol. IV. 1879, p. 437; and Cat. Austr. Crust., p. 9.

*Huenia proteus*, Miers, Zool. 'Alert,' pp. 182 and 191, and 'Challenger' Brachyura, p. 35.

*Huenia proteus*, C. W. S. Aurivillius, Kongl. Svensk. Vet. Akad. Handl. XXIII. 1888–89, No. 4, p. 40, pl. iii. fig. 3.

*Huenia proteus*, R. I. Pocock, Ann. Mag. Nat. Hist. (6) V. 1890, p. 79.

*Huenia proteus*, Henderson, Trans. Linn. Soc., Zool. (2) V. 1893, p. 341.

*Huenia proteus*, Ortmann, Zool. Jahrb., Syst., etc., VII. 1893, p. 40.

Carapace flat, depressed, with two low elevations in the middle line, otherwise smooth: in the male the carapace is elongate triangular, with the lateral epibranchial angles produced to form small lobes, and sometimes with the hepatic regions expanded in the same way: in the female the carapace is quadrilobate, owing to the foliaceous extension of the hepatic and epibranchial angles. Rostrum long, simple, acute, deep, and laterally compressed. Supra-ocular spines small. Eyes small, deeply sunk beneath the pre-ocular spine, almost immovable.

In the male the chelipeds are somewhat shorter, and the next pair of legs (which are the longest) are somewhat longer than the carapace and rostrum combined: in the female the chelipeds are considerably shorter than, and the next pair of legs are about the same length as, the carapace and rostrum. In the female and young male the fingers, which are closely toothed, meet throughout the greater part of their extent: in the male they meet only at the tips.

The last three pairs of legs are very short. All the long joints, except the dactyli, of all the trunk-legs are more or less carinate dorsally (anteriorly), the carination often being more or less discontinuous in the case of the chelipeds: the dactyli of the ambulatory legs are stout, strongly recurved, and more or less toothed along the posterior margin.

In the Museum collection there are several females, but only two males, from various parts of the Andamans, up to 20 fathoms.

*SIMOCARCINUS*, Miers.

*Simocarcinus*, Miers, Journ. Linn. Soc., Zool., Vol. XIV. 1879, p. 649.

As *Huenia*, but without the supra-ocular spine; with the chelipeds much stouter, especially as to the palm, which is much inflated; and with the ambulatory legs more cylindrical.

*Simocarcinus pyramidatus* (Heller).

*Huenia pyramidata*, Heller, Crust. Roth. Meer., in SB. Akad. Wien XLIII. 1861 p. 307, pl. i. fig. 9.

*Description of the Male.*

Carapace elongate-triangular, narrowing to a huge, deep, laterally compressed rostrum of greater length than the carapace: the hepatic regions are marked by a faint bulge, and the lateral epibranchial angles are very sharp cut, while the limits of the posterior border are bounded on either side by a small lobule. Except for a somewhat elongate eminence on the gastric region and a tubercle on the posterior cardiac region, the carapace is perfectly smooth.

The eyes are deeply sunk, and nearly immobile, and the cornea is somewhat deficient in pigment.

The chelipeds, which are markedly stouter than the other legs, are a little shorter than the carapace and rostrum; and the next pair of legs, which are a good deal more than twice the length of the 3rd pair and than thrice the length of the 5th pair, are equal in length to the carapace and rostrum. The palms are broadly inflated; and the fingers, which are strongly arched, meet only at the tips.

The ambulatory legs are cylindrical, and their dactyli are stout, strongly recurved, and toothed along the posterior margin.

Our single perfect specimen—a male from the Nicobars—measures 30 millim. in length of carapace and rostrum.

*Simocarcinus simplex* (Dana)

*Huenia simplex* and *brevirostrata*, Dana, U. S. Expl. Exp. Crust. I. pp. 133 and 134, pl. vi. figs. 3a-c, 4a-c.

*Simocarcinus simplex*, Miers, Jour. Linn. Soc., Zool., Vol. XIV. 1879, p. 649; and 'Challenger' *Brachyura*, p. 35 (*ubi synon.*).

[*Simocarcinus simplex*, Cano, Boll. Soc. Nat. Napol. III. 1889, p. 173.]

*Simocarcinus simplex*, J. R. Henderson, Tr. Linn. Soc. Zool. (2) V. 1893, p. 342.

This species is distinguished from *Simocarcinus pyramidatus* (Hell.) (1) by the much shorter rostrum of the male; (2) by the presence of

three tubercles, disposed in a triangle, on the gastric region; (3) by the larger and more prominent eyes; (4) by the absence of the lobule on either side of the posterior border of the carapace; (5) by the much more massive chelipeds of the male.

This species is included in the Indian Fauna on the authority of Prof. J. R. Henderson. There are no specimens in the Indian Museum.

#### MENÆTHIUS, Edw.

*Menæthius*, Milne-Edwards, Hist. Nat. Crust. I. 338.

*Menæthius*, Miers, Journ. Linn. Soc., Zool., Vol. XIV. 1879, p. 649; and 'Challenger' Brachyura, p. 36.

Carapace subpyriform, moderately convex, and tuberculated on the dorsal surface, with a large triangulate præ-ocular spine, but no post-ocular spine. Rostrum simple, slender, acute, or emarginate at apex. Post-abdomen in the male seven-jointed, in the female usually five-jointed, the penultimate joint formed by the coalescence of three segments. Eyes small, mobile, but not perfectly retractile. Basal antennal joint slightly wider at the base than at the distal extremity, which is unarmed; flagellum exposed and visible from above at the side of the rostrum. Merus of the exterior maxillipedes truncated at the distal extremity and with a prominent antero-external angle, and slightly notched at the antero-internal angle where it is articulated with the next joint. Chelipedes (in the male) well developed, with the palm slightly compressed; fingers acute, and having between them, when closed, an interspace at the base. Ambulatory legs of moderate length; the joints subcylindrical, not dilated or compressed; dactyli slightly curved and partially retractile. (Miers).

#### *Menæthius monoceros*, (Latr.) Edw.

[*Pisa monoceros*, Latr., Encycl. X. 139.]

*Inachus arabicus*, Rüppell, Krab. Roth. Meer., p. 24, pl. v. fig. 4.

*Menæthius monoceros*, Milne-Edwards, Hist. Nat. Crust., Vol. I. p. 339.

*Menæthius subserratus*, *porcellus*, and *tuberculatus*, Adams and White, 'Samarang' Crustacea, pp. 18 and 19, pl. iv. figs. 1 and 2.

*Menæthius angustus*, *depressus*, *subserratus*, *tuberculatus*, *areolatus* and *inornatus*, Dana, U. S. Expl. Exped., Crust. I. pp. 121-125, pl. iv. figs. 5a-7g, and pl. v. figs. 1a-3d.

*Menæthius subserratus*, *dentatus* and *depressus*, Stimpson, Proc. Ac. Nat. Sci. Philad., 1857, p. 219.

*Menæthius monoceros*, Heller, Crust. Roth. Meer., SB. A.K. Wien, XLIII. 1861, p. 306.

*Menæthius monoceros*, A. Milne-Edwards in Maillard's L'île Réunion, Annexe F, p. 6; and *rugosus* p. 7, pl. xvii. fig. 2.

MENÆTHIUS MONOCEROS, A. MILNE-EDWARDS, NOUVELLES ARCHIVES DU MUSÉUM IV 1868, p. 70, and VIII 1872. PP. 252 and 253 (CBI. SYNON.)

*Menæthius monoceros*, Miers, Phil. Trans. Vol. 168, 1879, p. 485, and Zoology 'Alert,' pp. 182, 190, 517 and 521, and 'Challenger' Brachyura, p. 37.

*Menæthius monoceros*, Haswell, P. L. S., N. S. Wales, Vol. IV. 1879, p. 437, and Cat. Austr. Crust., p. 9.

*Menæthius monoceros*, de Man, Notes Leyden Mus. II. 1880, p. 171, and Archiv. f. Naturges. LIII. 1887, i. 219.

*Menæthius monoceros*, Richters in Möbius Meeresf. Mauritius, p. 145.

[*Menæthius monoceros*, Cano. Boll. Soc. Nat. Napol. III. 1889, p. 175.]

*Menæthius monoceros*, Henderson, Trans. Linn. Soc. Zool. (2) V. 1893, p. 342.

"*Menæthius monoceros*, Ortmann, Zool. Jahrb. Syst., etc., VII. 1893, p. 41.

Carapace elongate-triangular, most markedly so in the male, the lateral epibranchial angles sharp-cut, and the surface very variably tuberculated.

The rostrum, which is flanked on either side by the forwardly-directed supra-ocular spine, is styliform, acute, and horizontally compressed, its length being about half that of the carapace in the male, but a good deal less in the female.

The small eyes are imperfectly retractile, and project freely from beneath the supra-ocular spine.

The chelipeds in the male are as long as, or a little longer than, the 2nd pair of legs, or about equal in length to the carapace and rostrum: they are very much stouter than any of the other legs, and have a somewhat inflated palm, and fingers which meet only at the tips.

The chelipeds in the female are not stouter than the other legs, and are considerably shorter than the next pair of legs, which, again, are a good deal shorter than the carapace and rostrum: the fingers meet through the greater part of their extent.

The 3rd-5th pair of legs are very much shorter than the 2nd pair: in all the dactyli are strongly recurved and are toothed along the posterior margin.

Very numerous specimens from the Andamans and Nicobars.

#### ACANTHONYX, Latr.

[*Acanthonys*, Latreille, Regne Animal, (2) IV. 58.]

*Acanthonys*, Milne-Edwards, Hist. Nat. Crust. I. 342.

*Acanthonys*, A. Milne-Edwards, Miss. Sci. Mex., Crust. I. 142.

*Acanthonys*, Miers, Journ. Linn. Soc., Zool., Vol. XIV. 1879, p. 650; and 'Challenger' Brachyura, p. 42.

Carapace sub-oblong, rounded behind, and with the dorsal surface usually depressed, not markedly constricted behind the prominent antero-lateral angles, the lateral branchial spines small and not prominent. Præ-ocular spine prominent, acute. Spines of the rostrum united at the base, acute and but little divergent. Post-abdomen in the male six-jointed. Eyes small, mobile, but not completely retractile. Basal an-

tennal joint narrowing slightly from the base to the distal extremity, which is unarmed; flagellum exposed and visible from above at the side of the rostrum. Merus of the exterior maxillipeds truncated at the distal extremity and but slightly notched at the antero-internal angle, where it is articulated with the next joint. Chelipeds (in the adult male) well developed; palm compressed, but slightly turgid in the middle, and often slightly carinated above; fingers acute, and having between them, when closed, an interspace at the base. Ambulatory legs short, with the penultimate joints more or less dilated and compressed and armed with a tooth or lobe on its inferior margin, against which the small acute dactylus closes. (Miers).

*Acanthonyx macleayi*, Krauss.

*Acanthonyx macleayi*, Krauss, Sudafrican. Crust., p. 47, pl. iii. fig. 6.

*Acanthonyx macleayi*, Miers, 'Challenger' Brachyura, p. 43.

Carapace sub-quadrangular, with the hepatic and lateral branchial spines well developed: these spines, as well as the spines of the rostrum and the carapace immediately behind the rostrum, are tufted with setæ; and on the gastric region in a line with the hepatic spines are two elevated tufts of setæ. Except for the spines and elevations above-mentioned, and for a slight median elevation in its posterior half, the carapace, both as to its margins and as to its surface, is perfectly smooth and unarmed.

The supra-ocular spines are parallel with, and in the female almost comparable in size with the rostral spines.

The chelipeds in the male, but not in the female, are much stouter than any of the other legs: in the male they are nearly as long as the carapace, and have the carpus and palms much inflated, and the fingers in contact only at their tips: in the female they are only about two-thirds the length of the carapace, and have the joints slender, and the fingers closely apposable throughout.

The other legs, which are subchelate, are not disproportionately short compared with the chelipeds: the last pair is sub-dorsal in position.

In the Museum collection are specimens from Karáchi.

*Acanthonyx consobrinus*, A. Milne-Edwards.

*Acanthonyx consobrinus*, A. Milne-Edwards, in Maillard's l'Ile de la Réunion, Annexe F. p. 7, pl. xvii. figs. 3, 3b.

*Acanthonyx consobrinus*, Heller, 'Novara' Crustacea, p. 5.

"Carapace broadened, and a little swollen, surface non-granular. Gastric region with three ill-defined tubercles. Cardiac region either smooth or with sometimes a trace of a rudimentary tubercle. Latero-

anterior border cut into four or five teeth, of which the first, or external orbital angle, is small and pointed, the second larger *et à extrémité mousse*, and the others successively smaller. The rostrum consists of two short stout spines, and the supra-ocular border forms a spine. Chelipeds short: fingers evenly toothed. Ambulatory legs ending in a recurved claw. The abdomen of the male consists of 5 segments, the 2nd, 3rd and 4th being fused together.

There are no specimens of this species in the Museum Collection, which is included in this Fauna on the authority of Dr. Heller who mentions it in the 'Novara' Collection, from Madras.

The genus or sub-genus *Scyramathia* has, I think, very close affinities with the genus *Pugettia*, and is certainly, I think, a close link between this sub-family and the following.

### Sub-family iii. PISINÆ.

Eyes with commencing orbits, of which one of the most characteristic parts is a large, blunt, usually isolated and cupped post-ocular tooth or lobe, into which the eye is retractile, but never to such an extent as to completely conceal the cornea from dorsal view: there is also almost always a prominent supra-ocular eave, the anterior angle of which is sometimes produced forwards as a spine. Eye-stalks short. Basal antennal joint broad, at any rate at the base; its anterior angle generally produced to form a tooth or spine. Merus of the external maxillipeds, owing to the expansion of its antero-external angle, broader than the ischium, and carrying the palp at its antero-internal angle. Rostrum two-spined (in *Doclea* obscurely so). Legs often very long.

#### Key to the Indian Genera.

Alliance 1. PISOIDA. Supra-ocular eave not in close contact with the post-ocular spine or process, and generally produced, but not very conspicuously, at the antero-external angle in the plane of the rostrum.

- |   |  |   |   |        |   |
|---|--|---|---|--------|---|
| I. Spines of the rostrum separate from the base, usually long and divergent.                                | 1. Post-ocular tooth either not cupped, or if cupped then the carapace is armed with long acute spines of uniformly large size and regular arrangement ... | SCYRAMATHIA.  |   |        |   |
|   | 2. Post-ocular tooth deeply cupped; spines of the carapace, if present, never of uniform size and arrangement.   | <table border="0"> <tr> <td>i. Spines of the rostrum bearing a secondary spinule, either at tip or somewhere in their distal half .....</td> <td>NAXIA.</td> </tr> <tr> <td>ii. Spines of the rostrum without a secondary spinule</td> <td>HYASTENUS.</td> </tr> </table> | i. Spines of the rostrum bearing a secondary spinule, either at tip or somewhere in their distal half ..... | NAXIA. | ii. Spines of the rostrum without a secondary spinule |
| i. Spines of the rostrum bearing a secondary spinule, either at tip or somewhere in their distal half ..... | NAXIA.   |   |   |        |   |
| ii. Spines of the rostrum without a secondary spinule   | HYASTENUS.   |   |   |        |   |

- |   |  |               |
|---|--|---------------|
| II. Spines of the rostrum coalescent in their basal half. | 1. Carapace sub-circular or globular: rostrum emarginate: ambulatory legs of moderate length, stout: the entire body, and the appendages in great part, densely tomentose .....  | DOCLEA.       |
|   | 2. Carapace broadly triangular: tip of the rostrum deeply cleft: ambulatory legs extremely long and slender.   | CHORILIBINIA. |
|   | i. Post-ocular lobe completely isolated both from the supra-ocular eave and from the basal antennal joint: 2nd pair of trunk-legs never approaching six times the length of the carapace...  |               |
|   | ii. Space between the post-ocular lobe and the supra-ocular eave, as well as that between the post-ocular lobe and the basal antennal joint occupied by a spine: 2nd pair of trunk-legs six or more times the length of the carapace ..... | EGERIA.       |

Alliance 2. LISSOIDA. Supra-ocular eave in the closest contact with the post-ocular process, and with its antero-external angle almost always (always in Indian genera) very strongly produced forwards in the plane of the rostrum.

- |   |               |
|---|---------------|
| i. Surface of carapace tubercular: chelipeds of the male stouter than those of the female: abdomen of the female seven-jointed..... | TYLOCARCINUS. |
| ii. Surface of carapace spiny: chelipeds of the male not stouter than those of the female: abdomen of the female five-jointed.....  | HOPLOPHEYS.   |

### Alliance I. PISOIDA.

#### • SCYRAMATHIA, A. Milne-Edwards.

*Scyramathia*, A. Milne-Edwards, Compt. Rend. XCI. 1881, p. 356.

*Scyramathia*, Sars, Norwegian North-Atlantic Expedn., Crustacea I<sup>a</sup>. p. 5.

*Scyramathia*, S. I. Smith, 'Albatross' Crustacea (1884), 1886, p. 21.

*Anamathia* (part) Miers, 'Challenger' Brachyura, p. 25.

Carapace pyriform or elongate-triangular, armed either with tubercles, or with long spines much like those of *Anamathia* in their uniform size and definite arrangement: the hepatic and lateral epi-



branchial spines are always prominent and very conspicuous. The rostrum consists of two spines, which are usually long and slender. The eyes are small, and are retractile against a sharp post-ocular process which commonly is but little cupped: there is also a supra-ocular eave which terminates either in a forwardly directed tooth or in an upturned spine. Basal antennal joint not very broad, sharply truncated: the mobile portion of the antennæ freely exposed on either side of the rostrum.

Merns of the external maxillipeds as broad as the ischium, slightly expanded at the antero-external angle, and bearing the palp at the antero-internal angle.

Chelipeds in the adult male (but not in the female and young male) enlarged, with the palms broadened and compressed.

First pair of ambulatory legs markedly the longest.

The abdomen in both sexes consists of seven distinct segments.

There is certainly a close superficial resemblance between this genus and *Anamathia*; but I quite agree with Prof. Sars that the two forms are not very closely united. Prof. Sars thinks that *Scyramathia* is nearest to *Hyastenus*, an opinion with which I concur, although I also think that there are quite as close relations to *Pugettia*.

### *Scyramathia pulchra*, Miers.

*Anamathia pulchra*, Miers, 'Challenger' Brachyura, p. 26, pl. iv. fig. 1 (adult male).

*Anamathia livermorii*, Wood-Mason, Ann. Mag. Nat. Hist. March 1891, p. 260 (young male and adult female).

Body and limbs everywhere closely covered with short hairs, which on the carapace are peg-shaped; and with numerous long scattered setæ. The carapace, which is subpyriform, is armed with twenty long sharp spines disposed in five longitudinal series. Of these spines five are on the gastric region, one is on the cardiac, and one on the intestinal region, one stands above either eye, one on each hepatic, and four on each branchial region: in addition there is a distinctly cupped post-ocular lobe.

The rostrum consists of two slender divergent spines, the length of which is more than half that of the carapace.

The eyes are small, and the cornea, though retractile against the post-ocular lobe, can never be concealed.

The basal antennal joint is broad, and has its antero-external angle somewhat produced: the mobile portion of the antenna is completely exposed to dorsal view.

The external maxillipeds have the ischium and merus somewhat concave.

The chelipeds vary according to sex. In the adult male they are longer than the carapace and rostrum, and are far stouter than any of the other legs: the carpus is enlarged and sculptured, the palm is broadened, as well as somewhat carinate along both edges and strongly produced at the postero-inferior angle, and the fingers are opposable in their distal half only: in the female and young male they are shorter than the carapace with the rostrum, and are hardly stouter than the other legs; all the joints are subcylindrical, and the fingers are appposable in the greater part of their extent.

In both sexes, the merus of all the legs, including the chelipeds, has a spine or tooth at the far end of its upper margin. The 2nd pair of trunk-legs, which are the longest, are, in the male, nearly twice the length of the carapace and rostrum, but in the female are considerably shorter.

*Loc.* Andaman Sea, 130 to 561 fathoms.

*Scyramathia rivers-andersoni*, n. sp.

Carapace closely covered with peg-shaped hairs with long setæ interspersed: legs with few setæ. The carapace, which is pyriform and somewhat inflated, has, besides a supra-ocular tooth and a sharp post-ocular process, and besides a salient hepatic spine, and a still more salient lateral epibranchial spine (about two-fifths the greatest breadth of the carapace in length) six sharply conical tubercles evenly and equidistantly arranged in a circle round a central cardiac tubercle: of these the most posterior overhangs the middle of the posterior border, while the most anterior, which is situated far back on the gastric region, is flanked on either side by a very faint eminence.

The rostrum consists of two slender divergent horns, the length of which in the male is about three-quarters, in the female about two-thirds, that of the rest of the carapace.

The eyes are small, and though freely movable forwards are not retractile backwards further than to impinge against the summit of the post-ocular process of the carapace. The basal antennal joint, which is of no great width, is sharply truncated: the mobile portion of the antenna is freely exposed on either side of the rostrum.

The chelipeds in the fully adult male (but not in the young male) are much stouter than the other legs, and are as long as the carapace and rostrum; their merus is prismatic with knife-like edges, the upper edge ending in a spine; their carpus is bicarinate, the outer carina being very prominent; the hands, which form nearly half their total

length, have the palm carinate along the upper edge, and the fingers slightly separated when closed.

In the female the chelipeds are not stouter than the other legs, are not much longer than the carapace proper, and have the fingers closely appposable throughout.

Of the ambulatory legs the first are much the longest, being nearly half again as long as the carapace and rostrum; while the last two pairs are very short and have their dactyli reduced in length, increased in strength, and strongly recurved.

	Male.	Female.
Length of carapace and rostrum...	21 millim.	16.5 millim
„ rostrum ...	9 „	7 „
„ chelipeds ...	21 „	11 „
„ 2nd pair of trunk-legs...	31 „	20 „
„ 5th ...	15 „	11 „

*Loc.* Off Malabar coast, 406 fms.

*Scyramathia beauchampi* (Alcock and Anderson).

*Anamathia beauchampi*, Alcock and Anderson, J. A. S. B., 1894, Pt. ii. p. 185.

Body and legs downy, and with numerous large coarse curly clavate hairs, which are very regularly arranged on the legs, where also they are coarsest and closest. Carapace sub-triangular, with the following armature:—

On either hepatic region a great up-curved earlike spine (without any bullous base). On either branchial region, posteriorly, a strong up-turned spine; and anteriorly, near the middle line, a smaller coarse tooth. On the gastric region four sharpish tubercles. On the narrow sunken cardiac region a coarse sharp tooth. On the posterior border, in the middle line, a coarse granule.

The rostrum consists of two more (♀) or less (♂) divergent spines, the length of which is about one-third that of the rest of the carapace.

The eyes are small, and are almost devoid of pigment: they are to some extent hidden beneath a pre-ocular tooth of moderate dimensions, and are retractile against a larger laterally-compressed post-ocular plate.

The antennæ are completely exposed, from the base of the second joint of the peduncle.

The chelipeds in the male are massive, and in length are more than half again as long as the carapace and rostrum: all their joints, from

the ischium to the propodite, have one or more of their edges conspicuously and sharply cristiform, this being specially well marked in the case of the long trigonal meropodite, which has all its edges sharply phalanged, and in the case of the equally long slightly inflated palm, which has razor-like edges. The fingers, which are not nearly half the length of the palm, are acute, and have their cutting edges entire.

The 2nd-5th pairs of legs are slender, with cylindrical joints, the 2nd are nearly or quite equal in length to the chelipeds, the 3rd-5th decrease gradually in size.

In an adult female, equal in size to the male above described, the chelipeds are shorter than the 2nd pair of legs, and are similar in general proportions to the other legs.

Colours in life : "Earth-colour with the chelipeds pink."

	Male.		Female (adult.)
Length of carapace (including rostrum)...	18 millim. ...		15.5 millim.
Greatest breadth of carapace	... 12.5	,, ...	11.5 "
Length of cheliped	... 29	,, ...	14 "
Greatest breadth of palm	... 4.5	,, ...	1 "

*Loc.* Bay of Bengal, 193 and 210 fathoms.

The ova are large (diam. 1 millim.) and rather few in number.

In young males the chelipeds are of proportions intermediate between those of the adult male and female.

### *Scyramathia globulifera*, Wood-Mason.

*Pugettia globulifera*, Wood-Mason, Ann. Mag. Nat. Hist. March, 1891, p. 260.

Distinguished by the vertically erect ear-like hepatic spine, the base of which forms a great polished bulla on either side of the buccal frame, giving the animal, when viewed front end on, a bat-like appearance.

The body and legs are downy, the legs being fringed with short broad curly hairs.

The carapace, in which the cardiac region is broad and prominent and not, as in *S. beauchampi*, narrow and sunken, has, besides the hepatic spine already mentioned, the following marks :—

On the branchial regions, below and anteriorly, a sharp sinuous human-ear-shaped crest; above and posteriorly a spine; and near the middle line anteriorly an acumination. On the gastric region four faint

elevations. On the cardiac region, and also on the intestinal region, in the middle line, an acuminate eminence.

The rostrum consists of two divergent spines, about one-third the length of the rest of the carapace.

The eyes stand well out from beneath the pre-ocular spine, and are retractile against a small post-ocular tooth.

The other appendages closely resemble those of the preceding species; but the chelipeds, in the adult male, are shorter, being only equal in length to the carapace and rostrum, and the fingers have their cutting edges crenulate instead of smooth.

In females and in young males the chelipeds have the same relative proportions as in *Scyramathia beauchampi*.

	Male.	Female (adult)
Length of carapace (including rostrum)...	17 millim....	13 millim
Greatest breadth of carapace...	... 10 „ ...	7.5 „
Length of cheliped ...	... 18 „ ...	9.5 „
Greatest breadth of palm ...	... 4 .. ...	1.2 ..

*Loc.* Andaman Sea, 130–240 fathoms.

Miers *Pugettia velutina* ('Challenger' Brachyura, p. 41, pl. vi. figs. 2, 2a, 2b) should, I think, be placed in this sub-genus—*Scyramathia*.

#### HYASTENUS, White.

*Hyastenus*, White, P. Z. S., 1847, p. 56.

*Hyastenus*, Miers, Journ. Linn. Soc., Zool., Vol. XIV. 1879, p. 658 (*et synon.*); and 'Challenger' Brachyura, p. 55.

*Chorilia* and *Lahainia*, Dana, U. S. Expl. Exp. Crust. I. pp. 91 and 92.

Carapace subpyriform, convex, either smooth or tuberculate, sometimes spiny. Supra-ocular eave very prominent, usually somewhat acuminate produced anteriorly: post-ocular spine, or lobe, large and excavated. The rostrum consists of two usually long slender divergent spines. Eye-stalks short, retractile against the post-ocular lobe, but never to the complete concealment of the cornea.

Basal antennal joint broad, its antero-external angle sometimes produced: the mobile portion of the antenna usually exposed to dorsal view.

Merus of the external maxillipeds as broad as, or broader than, the ischium, expanded at the antero-external angle, and bearing the palp at the antero-internal angle.

Chelipeds in the adult male enlarged: the second pair of trunk-legs usually very much longer than the 3rd 4th and 5th pairs.

The abdomen in both sexes consists of seven distinct segments.

Key to the Indian species of *Hyastenus*.

- |  |   |  |  |   |
|--|---|--|--|---|
| <p>I. Denuded carapace with numerous tubercles, or spines, and erosions.</p> | <p>1. Rostral spines at least as long as the carapace proper.</p>                   | <p>i. Rostral spines as long as the carapace, and nearly parallel in their proximal half: carapace indistinctly tuberculated.....</p> <p>ii. Rostral spines about twice as long as the carapace, and widely divergent from their origin: carapace with numerous tubercles, and with large cardiac, branchial and intestinal spines: a long terminal spine on the merus of the second pair of trunk-legs.....</p> | <p>[<i>H. setæ.</i>]</p> <p><i>H. tenuicornis.</i></p>   |   |
|  | <p>2. Rostral spines not much more than half the length of the carapace proper.</p> | <p>i. Legs coarse, the meropodites of all (including the chelipeds) nodular.</p>   | <p>a. Numerous tubercles forming a cross on the gastric region: a median transverse tubercle in the groove between the gastric and cardiac regions.....</p> <p>b. Gastric region almost smooth: no tubercle between the gastric and cardiac regions.....</p> | <p><i>H. pleione.</i></p> <p><i>H. hilgendorfi.</i></p> |
|  | <p>"</p>  | <p>ii. Legsslender, the meropodites smooth.</p>  | <p>a. Carapace elongate closely covered with granules and tubercles, without spines.....</p> <p>b. Conspicuously large spines on the cardiac and branchial regions.....</p>  | <p><i>H. oryz.</i></p> <p><i>H. gracilirostris.</i></p> |

II. Denuded carapace smooth and polished, with a few large spines.	1. Carapace triangular, with a large epibranchial spine and at least one large sub-hepatic tubercle on either side.	i. A large intestinal and two large gastric spines in the middle line.....	<i>H. spinosus.</i>		
		ii. No large intestinal spine: a single gastric tubercle in the middle line.....	<i>H. diacanthus.</i>		
	2. Carapace elongate, with a small epibranchial tubercle, and with none of the sub-hepatic tubercles enlarged.	i. A pair of gastric tubercles in the middle line.....	<i>H. aries.</i>		
		ii. Gastric region without tubercles.	<table><tr><td>a. An erect claw-like intestinal spine</td><td><i>H. calvarius.</i></td></tr><tr><td>b. No intestinal spine.....</td><td><i>H. planasius.</i></td></tr></table>	a. An erect claw-like intestinal spine	<i>H. calvarius.</i>
a. An erect claw-like intestinal spine	<i>H. calvarius.</i>				
b. No intestinal spine.....	<i>H. planasius.</i>				

*Hyastenus pleione* (Herbst).

*Cancer pleione*, Herbst, Krabben, III. iii. 52, taf. lviii. fig. 5.

*Nazia pleione*, Gerstaecker. Archiv. fur Naturgesch. XXII. 1856, p. 114, taf. v. figs. 1-2.

*Hyastenus pleione*, A. Milne-Edwards, Nouv. Archiv. du Mus. VIII. 1872, p. 250.

*Hyastenus pleione*, de Man, Archiv. fur Naturgesch. LIII. 1887, p. 225, taf. vii. fig. 3; and Journ. Linn Soc., Zool., Vol. XXII. 1888, p. 18.

*Hyastenus pleione*, Miers, 'Challenger' Brachyura, p. 56.

*Hyastenus pleione*, J. R. Henderson, Trans. Linn. Soc. (2) V. 1893, p. 343.

Carapace triangular, elegantly rounded behind, pubescent like the legs and rostrum, the regions well-defined, tuberculated as follows:—six tubercles disposed in a Y or cross on the gastric region, one in the groove between the gastric and the extremely prominent cardiac region, one in the middle of the intestinal region, and three in a line on the boundary of the hepatic and pterygostomial regions; on either branchial region are two longitudinal rows of tubercles, the upper row being the more distinct, but the last tubercle in the lower row being the largest, and forming a rather prominent epibranchial spine; finally on either side of the groove separating the cardiac and intestinal regions is a prominent tooth.

The rostrum consists of two slender divergent spines, which in the male are half the length of the carapace proper, but in the female are considerably less.

The basal antennal joint has its outer margin, anteriorly, bilobed.

The hairy trunk-legs have the upper surface somewhat uneven or actually nodular.

The chelipeds in the male are stouter than the other legs, and are as

long as the carapace *plus* half the rostrum; the fingers, which are hardly one half shorter than the short palm, are arched and meet only near their tips: in the female the chelipeds are rather more slender than the other legs, are only as long as the post-ocular portion of the carapace, and have nearly straight fingers that meet in the greater part of their extent.

The second pair of legs, in both sexes, are considerably longer than the chelipeds and than any of the three last pairs: the dactyli of all the ambulatory legs are stout, recurved, and serrated along the posterior margin.

In the Museum collection are numerous specimens of both sexes, from Ceylon and Mergui.

*Hyastenus hilgendorffi*, de Man.

*Hyastenus hilgendorffi*, de Man, Journ. Linn. Soc., Zool., Vol. XXII. 1888, p. 14, pl. i. figs. 3 and 4.

This species much resembles *H. pleione*, but is distinguished by the following constant characters:—the carapace is but faintly tuberculated, and, in particular, there is no tubercle between the gastric and cardiac regions: the dactyli of the ambulatory legs are very strongly toothed, instead of merely serrated, along the posterior margin: in the male the rostrum is nearly two-thirds the length of the carapace, and the chelipeds are as long as the carapace and rostrum combined, and nearly as long as the second pair of trunk-legs,—this being largely due to the increased length of the palm.

Carapace subpyriform, and, like the rostrum and legs, pubescent; the regions moderately well-defined.

The gastric region is either quite smooth, or presents three faint elevations disposed in a triangle base forwards. There is a small tubercle near the middle of the intestinal region; and a line of granulations along the boundary between the hepatic and pterygostomial regions, which line is continued backwards, along the side of the branchial region, to end at a distinct lateral epibranchial spine: there is also a more or less distinct line of granules on the dorsal aspect of the epibranchial region.

The rostrum consists of two divergent spines, the length of which in the male is nearly two-thirds that of the carapace proper, but is considerably less in the female. Basal antennal joint with the outer margin sinuously curved.

The trunk-legs have the surface somewhat uneven: the chelipeds in the male are much stouter than the other legs, and are as long as the



carapace and rostrum, the palm being nearly twice the length of the fingers, which are not much arched and meet in their distal half: in the female the chelipeds are rather slenderer than the other legs, and are equal to the postrostral portion of the carapace in length. The 2nd pair of legs are hardly longer than the (male) chelipeds, but are very much longer than the last three pairs: the dactyli in all are stout, recurved, and strongly toothed along the posterior margin.

Specimens are in the Museum collection from Ceylon, Ganjam, Mergui, the Nicobars, and the Straits of Malacca.

*Hyastenus diacanthus* (de Haan).

*Pisa (Nazia) diacantha*, de Haan, Faun. Japon. Crust., p. 96, pl. xxiv. fig. 1.

*Nazia diacantha*, Adams and White, 'Samarang' Crust., p. 10.

*Nazia diacantha*, Stimpson, Proc. Acad. Nat. Sci. Philad. 1857, p. 218.

*Nazia diacantha*, Heller, 'Novara' Crust., p. 3.

*Hyastenus diacanthus*, A. Milne-Edwards, Nouv. Archiv. du Mus. VIII. 1872, p. 250.

*Nazia diacantha*, Brocchi, Ann. Sci. Nat. (6) II. 1875, Art. 2, p. 94, pl. xix. figs. 172, 173 (male appendages).

*Hyastenus diacanthus*, Miers, Cat. Crust. New Zealand, p. 9; and P. Z. S., 1879, pp. 19 and 26; and Zoology H. M. S. 'Alert,' pp. 182 and 194; and 'Challenger' Brachyura, p. 57.

*Hyastenus diacanthus*, Haswell, P. L. S., N. S. Wales, Vol. IV. 1879, p. 442; and Cat. Austral. Crust., p. 20.

*Hyastenus diacanthus*, de Man, Archiv. fur Naturgesch., LIII. 1887, p. 220.

*Nazia diacantha*, C. W. S. Aurivillius, Kongl. Sv. Vet. Akad. Handl. XXIII. 1888-89, No. 4, p. 51, pl. ii. fig. 5.

[*Hyastenus diacanthus*, Cano, Boll. Soc. Nat. Napol. III. 1889, p. 178.]

*Hyastenus diacanthus*, A. O. Walker, Journ. Linn. Soc., Zool., Vol. XX. 1890, p. 109.

*Hyastenus diacanthus*, Ortmann, Zool. Jahrb., Syst., etc., VII. 1893, p. 55; and Zool. Forsch. Austral. Malay. Archip., Jena., 1894, p. 42.

*Hyastenus diacanthus*, Mary Rathbun, Proc. U. S. Nat. Mus. Vol. XVI. 1893, p. 85.

Body and legs densely tomentose, often much encrusted with sponges, etc. Carapace pyriform, with the regions strongly convex, well-defined, and when denuded, smooth and polished: on the gastric region, in the middle line, there is an acuminate tubercle, on either pterygostomian region at least one large tooth, and near the hinder limit of either branchial region a horizontally projecting lateral epibranchial spine.

The rostrum consists of two more or less divergent horns, the length of which in the adult male is from half to nearly two-thirds that of the carapace proper, but in the female is less. The basal antennal joint is much inflated behind and constricted in front.

The chelipeds in the male are stouter than any of the other legs, and are equal in length to the carapace *plus* half the rostrum; the fingers, which are arched and meet in rather less than their distal half, are nearly as long as the short inflated palm. In the female and young male the chelipeds are rather more slender than any of the other legs, and in length are equal to the post-ocular portion of the carapace; and the fingers, which are almost straight, meet in the greater part of their extent. The second pair of trunk-legs are nearly twice the length of the (male) chelipeds, and are far longer than any of the last three pairs: the recurved and densely tomentose dactyli have the posterior margin almost smooth.

Besides specimens from the Australian and Chinese Seas, the Museum possesses specimens from Ceylon, Orissa, Tavoy, and the Andamans.

*Hyastenus spinosus*, A. Milne-Edwards.

*Hyastenus spinosus*, A. Milne-Edwards, Nouv. Archiv. du Mus., VIII. 1872, p. 250.  
*Hyastenus spinosus*, Miers, 'Challenger' Brachyura, p. 56.

This species differs from *H. diacanthus* only in the following particulars:—the body and limbs are less densely tomentose; the gastric region, instead of a single acuminate tubercle, has two strong spines in the middle line; there is a stout spine, in the middle line, close to the posterior border of the carapace; the lateral epibranchial spines are larger.

These differences are constant in a large series of specimens from different parts of the sea-coast of India: but in two specimens which seem referable to this species the gastric region is quite smooth, though abnormally convex.

*Hyastenus aries* (Latr.)

[*Pisa aries*, Latr. Encyc. X. p. 140].  
*Chorinus aries*, Milne-Edwards, Hist. Nat. Crust. I. 315.  
*Hyastenus aries*, A. Milne-Edwards, Nouv. Archiv. du Mus., VIII. 1872, p. 250.  
*Chorinus aries*, Hülgenhof, MB Ak. Wiss. Berl. 1878, p. 786.  
*Chorinus aries*, E. Nauck, Zeits. Wiss. Zool. XXXIV. 1880, p. 41 (gastric teeth).  
*Hyastenus aries*, Miers, 'Challenger' Brachyura, p. 56.

Very closely resembling *H. spinosus*, from which it differs only in the following particulars—adult males of nearly equal size being compared:—(1) the rostral horns, instead of being long cylindrical divergent and down-curved only at tip, are short (being only one-third the length of the carapace proper in the male, and only about one-fourth

in the female), somewhat compressed horizontally, almost parallel or even a little incurved, and perceptibly though very slightly deflexed from the base; (2) the carapace is much more convex and swollen, with the lateral epibranchial and the median posterior spines much smaller; (3) the chelipeds have the palm less enlarged, and the fingers nearly straight, instead of arched; (4) the anterior angle of the supra-orbital cave, instead of being sharply produced, is obtuse.

The Museum possesses specimens from the Orissa Coast and Gulf of Martaban, and also from the Straits of Malacca.

*Hyastenus planasius*, Ad. & White.

*Pisa planasia*, Adams and White, 'Samarang' Crust., p. 9, pl. ii. figs. 4 and 5.

*Hyastenus planasius*, A. Milne-Edwards, Nonv. Archiv. du Mus., VIII. 1872, p. 250.

*Hyastenus (Chorilia) planasius*, Miers, Zoology H. M. S. 'Alert,' pp. 182 and 196; and 'Challenger' Brachyura, p. 57.

*Hyastenus planasius*, Walker, Journ. Linn. Soc. Zool. Vol. XX. p. 109.

Carapace elongate-ovate, its surface smooth and polished anteriorly, finely granulose posteriorly, and with scattered tufts of hairs: a small eminence in the middle of the gastric region, and a small lateral epibranchial spinule, in front of which latter there may be a line of granules: lateral margin with three spinules anteriorly, two of which are on the pterygostomial region.

The rostrum is formed by two parallel spines, the tips of which are somewhat incurved, and the length of which is about one-sixth that of the carapace proper. The supra-ocular margin is, as usual, very prominent, and has its anterior angle somewhat produced. The antero-external angle of the basal antennal joint forms a distinct tooth visible from above. The legs are tomentose with additional long scattered setæ: the second pair (1st ambulatory legs) are, as usual, markedly the longest, being half again as long as the carapace and rostrum: the dactyli are short, stout, recurved, and serrated posteriorly. The chelipeds are described by Adams and White as follows:—"small, slender, equal in size, covered with scattered long stout hairs; the third joint sub-cylindrical, curved inwards and enlarged anteriorly; fourth joint short, rounded, and curved, with two small tubercles on the outer and upper surface; fifth joint rather slender, sub-cylindrical, laterally compressed; claws slightly gaping in the middle, curved inwards, and finely denticulated." As, however, the male specimen figured does not seem to be adult, these characters are perhaps changeable with age.

In the Museum collection are a young male and female from Ganjam and Arakan.

*Hyastenus calvarius*, n. sp.

This species—females alone being available for comparison—differs from *H. planasius* chiefly in the following characters:—(1) there is an erect claw-like spine on the posterior border of the carapace in the middle line; (2) the spines of the rostrum are straight, divergent, and about half the length of the carapace; (3) the dactyli are longer and slenderer.

Three females—two of which are laden with eggs—from the Andamans. The larger egg-laden female measures 14 millim. from the tip of the rostrum to the posterior border of the carapace.

*Description of the female.*

Carapace elongate-ovate, with the surface, when denuded of scattered setæ, smooth and polished: the gastric region is very convex: the only armature of the carapace is (1) a large erect claw-like spine near the posterior border in the middle line, (2) a small lateral epibranchial spinule on either side, and (3) two or three granules along the antero-lateral border in the pterygostomian region. The rostrum is formed of two straight divergent spines, the length of which is about half that of the carapace proper. The antero-lateral angle of the prominent supra-ocular eave is sharp; and that of the basal antennal joint is produced to form a spine which is plainly visible from above.

The legs are more or less fringed with stout club-shaped hairs: the second pair are, as usual, the longest: the dactyli are long and slender, and are recurved, with the posterior margin serrate. The chelipeds are slender, and the fingers meet in the greater part of their extent.

*Hyastenus sebæ*, White.

Seba, *Thesaurus*, III. xviii. 12.

*Hyastenus sebæ*, White, P. Z. S., 1847, p. 57; and *Ann. Mag. Nat. Hist.*, Vol. XX. 1847, p. 61; and 'Samarang' *Crustacea*, p. 11.

*Hyastenus sebæ*, A. Milne-Edwards. *Nouv. Archiv. du Mus.*, VIII. 1872, p. 249.

*Hyastenus sebæ*, de Man. *Archiv. für Naturgesch.*, LIII. 1887, p. 223.

*Hyastenus sebæ*, Miers, 'Challenger' *Brachyura*, p. 56.

*Hyastenus sebæ*, Örtmann, *Zool. Forsch. Austral. Malay Archip. Jena*, 1894, p. 42.

Carapace very elongate-triangular, its surface eroded and sculptured, but without distinct tubercles or spines. The rostral spines, which are equal in length to the carapace, are paralled in their proximal half. The chelipeds in the male are equal in length to the carapace plus one-third of the rostrum: their merus is not much stouter than that of the next pair of legs, but the palm is broadened and somewhat inflated: the fingers, which are hardly more than half the length of 59

the palm, are arched, and meet only at the tip. The other legs are slender, the second pair being much longer than the last three pairs and longer than the chelipeds.

The Museum possesses a specimen from Mauritius, which I have included here for the sake of comparison.

*Hyastenus oryx*, A. Milne-Edwards.

*Hyastenus oryx*, A. Milne-Edwards, Nouv. Archiv. du Mus., VIII. 1872, p. 250, pl. xiv. fig. 1.

*Hyastenus oryx*, Haswell, Proc. Linn. Soc., N. S. Wales, Vol. IV. 1879, p. 442; and Cat. Austral. Crust., p. 20.

*Hyastenus (Chorilia) oryx*, Miers, Zool. H. M. S. 'Alert,' pp. 182 and 195, 517 and 522; and 'Challenger' Brachyura, p. 58.

*Hyastenus oryx*, de Man, Archiv. fur Naturgesch., LIII. 1887, p. 224, taf. vii. fig. 2.

*Hyastenus oryx*, C. W. S. Aurivillius, Kongl. Sv. Vet. Akad. Handl. XXIII. 1888-89, No. 4, p. 50, pl. iv. fig. 4.

*Hyastenus oryx*, A. O. Walker, Journ. Linn. Soc., Zool., Vol. XX. 1890, p. 109.

Carapace pyriform, little setose, crisply and rather closely tuberculated, but without any spines, the tubercles on the gastric region being disposed in the form of a cross or anchor. The rostrum consists of two slender horns, which in the male are about half the length of the carapace proper, and strongly resemble the horns of an *Oryx* in miniature: in the female they are not one-third the length of the carapace, and are nearly parallel.

The supra-ocular cave is sharply angled, but not produced, anteriorly. The basal antennal joint is sharply toothed at the antero-external angle.

The chelipeds in the male are as long as the carapace *plus* two-thirds of the rostrum. Their merus is slender, but the palms are broadened and inflated; and the fingers, which are from half to two-thirds the length of the palm, are arched, and meet only at the tip. In the female the chelipeds are considerably shorter than the post-ocular portion of the carapace, and are rather more slender than the ambulatory legs, the fingers being but little arched, and little separated when clenched.

The ambulatory legs are slender, with slender almost smooth actyli: the first pair, which are considerably the longest, are about one-fourth longer than the carapace and rostrum.

This, like *Hyastenus calvarius*, is a small species, an egg-laden female of average size measuring only 14 millim. from the tip of the rostrum to the posterior border of the carapace. It is a common species at the Andamans, and has also been taken off Ceylon at 34 fathoms.

*Hyastenus gracilirostris*, Miers.

*Hyastenus gracilirostris*, Miers, Ann. Mag. Nat. Hist., Vol. IV. 1879, p. 12, pl. iv. fig. 7; and 'Challenger' Brachyura, p. 58.

Carapace subpyriform, hardly at all setose, with numerous sharp tubercles and spinules. Specially noticeable are three spinules, longitudinally arranged in the middle line, on the gastric region, a strong conical spine on the cardiac region, a sharp tubercle on the posterior margin, and two spines on each of the branchial regions, of which the larger occupies the usual position of the lateral epibranchial spine.

The rostrum, which does not vary according to sex, consists of two slender divergent spines, the length of which is about one-third that of the carapace. The post-ocular lobe projects very strongly, and the supra-ocular eave has both the anterior and the posterior angle pronounced. The basal antennal joint has a well-marked tubercle or blunt spine at its antero-external angle.

The chelipeds in the male are equal in length to the post-rostral portion of the carapace, and have a few small granules on the merus carpus and upper edge of the palm; the merus is slender, but the palm is broadened and is not much longer than the fingers, which are arched and meet only at the tip. In the female the chelipeds are rather shorter than the post-ocular portion of the carapace, are very slender, and have nearly straight fingers.

The ambulatory legs are slender, with slender smooth-edged dactyli: the first pair are, as usual, much the longest.

This also is a small species, and egg-laden female of average size being only 10 millim. in length.

In the Museum collection are specimens from the Madras coast.

*Hyastenus tenuicornis*, Pocock.

*Hyastenus tenuicornis*, Pocock, Ann. Mag. Nat. Hist., Vol. V. 1890, p. 76.

Distinguished by the enormous length of the rostral spines, and by the curious form—described below—of the supra-ocular eave and post-ocular lobe.

Carapace subpyriform, somewhat depressed, with the regions well-defined; its surface with many long scattered setæ, and with numerous granules and some large spines. Specially noticeable are five or seven granules, arranged in the form of a cross, on the gastric region; two huge acuminate tubercles, in the middle line, posteriorly; and three spines on either branchial region, the hindmost and lowermost of which is of great size.

The rostrum consists of two slender, exceedingly divergent spines,

the length of which in the male is about twice, in the female about once and a fifth, that of the carapace.

The post-ocular lobe is unique in form: it is very prominent, and has a stout pedicle and a compressed crown, the angles of which are produced. The supra-ocular eave is also unique: it also is very prominent, and has its antero-external angle produced forwards and upwards, and its postero-external angle produced backwards towards the post-ocular lobe. The basal antennal joint is deeply grooved longitudinally: its antero-external angle forms a strong spine visible from above, and its outer edge bears two distinct teeth which stretch towards the supra-ocular and post-ocular spines respectively. All the trunk-legs are very slender: the first two pairs have a strong spine on the far end of the upper border of the merus, but this in the last three pairs is represented by a small tubercle. The chelipeds, even in the male, are slender throughout, and have long slender fluted palms which are three times the length of the fingers: the latter, though denticulated throughout and but little arched, meet, in the male, only in their distal half.

The first pair of ambulatory legs are, as usual, much the longest: in all the dactyli are long and slender, but have the posterior edge sharply serrated.

This also is a small species, an egg-laden female of average size measuring only 17 millim., more than half of which is rostrum.

Off Cheduba (Arakan coast) 7 fathoms: off Ceylon 30-34 fathoms.

Dr. Henderson (Tr. Linn. Soc., Zool., 1893, p. 344) also includes in the Indian Fauna, but with some doubt, the two following species:—

1. *Hyastenus convexus*, Miers Zool., H. M. S. 'Alert,' p. 196, pl. xviii. fig. B. (*N. E. Australia; Penang.*).

2. *Hyastenus brockii*, de Man, Archiv. fur Naturgesch. LIII., 1887, p. 221, taf. vii. fig. 1. (*Amboina*).

As Dr. Henderson seems to be not quite sure of his identification, and as we have no specimens in the Museum collection, I have not noticed these two species at length.

#### NAXIA, Edw., Miers.

*Naxia*, Milne-Edwards, Hist. Nat. Crust. I. 313.

*Naxia*, de Haan, Faun. Japon. Crust., p. 84.

*Naxia*, Miers, Journ. Linn. Soc., Zool., Vol. XIV. 1879, p. 658 (*et synon.* Naxioides, A. M. Edw. and Podopisa Hilgendorf); and 'Challenger' Brachyura, p. 59.

Carapace subpyriform, moderately convex, rounded behind, and armed with spines or tubercles on the dorsal surface. Spines of the

rostrum well developed, subcylindrical, parallel or divergent, and bearing on the inner margin, near to the extremity, a small accessory spine or spinule. Abdomen (in the male) distinctly seven-jointed; in the female some of the segments may be coalescent. Eyes small, supra-ocular cave very prominent, its antero-external angle sometimes produced to a spine: post-ocular lobe also very prominent, its edge unequally bi- or tri-lobed. Antennæ with the basal joint enlarged, with a spine or tubercle at the antero-lateral angle, and sometimes with another on the outer margin; the flagellum either exposed, or partially concealed in a dorsal view by the rostral spines. Merus of the external maxillipeds distally truncated, with the antero-external angle little, if at all, produced, and the antero-internal angle emarginate. Chelipeds (in the male) slender and moderately developed, palm usually somewhat elongated, fingers denticulated near the distal extremity, and having between them when closed a small hiatus at the base. Ambulatory legs slender and somewhat elongated, the first pair much the longest, with the joints subcylindrical; dactyli nearly straight.

*Key to the Indian species of Naxia.*

I. Armature of the carapace consisting almost entirely of large clean-cut spines ..... *N. hystrix*.

1 Spines of the rostrum parallel to near the tip: supra-ocular spine obsolete: meropodites of the trunk-legs without a terminal spine ..... *N. hirta*.

II. Armature of the carapace consisting chiefly of tubercles, among which there are sometimes a few coarse spines.

2. Spines of the rostrum divergent from the base: supra-ocular spine present: meropodites of some of the trunk-legs with a large terminal spine.

i. Spines of the rostrum considerably more than half the length of the carapace: supra-ocular spine very large and acute: meropodites of all the trunk-legs with a terminal spine: palms long and slender.

a. Rostral spines widely divergent: no large spines on the branchial or intestinal regions ..... *N. taurus*.

b. Rostral spines moderately divergent: several large spines on the branchial regions and in the middle line of the carapace ..... *N. cerastes*.

ii. Spines of the rostrum considerably less than half the length of the carapace: supra-ocular spine blunt: meropodites of the last three pairs of trunk-legs unarmed: palms short and inflated ..... *N. investigatoris*.



*Naxia investigatoris*, n. sp. Pl. IV. fig. 3.

Distinguished from all other Indian species by the form of the male chelipeds, of which the palm, instead of being long and slender, is short and broadly inflated.

Carapace subpyriform, with all the regions well-defined, and the whole surface, from the base of the rostral spines, sharply tubercular.

11. The rostral spines in the male and sometimes in the female are hardly one-third the length of the carapace proper, and are divergent, with the accessory spine in the middle of the distal half: often, but not always, in the female they are less than one-fourth the length of the carapace, are little divergent, and bear the accessory spinule near the tip. The antero-external angle of the prominent supra-ocular eave is surmounted by a blunt spine: the basal antennal joint has a similar spine at its antero-external angle, and another near the middle of its outer border.

The chelipeds are granular, and their meropodite has a small spinule at the distal end of its upper border: in the male they are a little longer than the carapace, the palm is short—less than twice the length of the fingers—inflated, and enlarged from behind forwards, and the fingers are strongly arched and meet only at the tip: in the female they are only as long as the post-rostral portion of the carapace, are slender throughout, and have nearly straight fingers. The 2nd pair of trunk-legs (1st pair of ambulatory legs) are  $2\frac{1}{2}$  times the length of the carapace, and have the meropodite armed with a strong spine at the distal end of its upper border, and the dactylus of remarkable length, nearly equal to the propodite: the other legs are much shorter, and have the spine replaced by a small tubercle, their dactylus being of ordinary length.

Colours in spirit, pale ochre.

*Loc.* Audamans; and off Ceylon, 34 fathoms.

	Male.	Ovigerous Female.
Length of carapace and rostrum ...	19 millim.	17 millim.
Greatest breadth of carapace ...	10.5 „	10 „
Length of chelipeds ... ..	23 „	14 „
Length of 2nd pair of legs...	41 „	36 „

*Naxia hirta*, A. Milne-Edwards.

*Nazioides hirta*, A. Milne-Edwards, Ann. Soc. Ent. Fr. (4) V. 1865, p. 143, pl. iv. fig. 1.

*Podopisa petersii*, Hilgendorf, MB. Ak. Berl., 1878. p. 785, taf. i. figs. 1-5.

*Naxia petersii*, Miers, Zoology of H. M. S. 'Alert,' p. 523.

*Nazia hirta*, Miers, 'Challenger' Brachyura, p. 61.

*Nazia petersii*, de Man, Journ. Linn. Soc., Zool., Vol. XXII. 1888, p. 19.

*Nazia hirta*, Pocock, Ann. Mag. Nat. Hist., Vol. V. 1890, p. 79.

*Nazia hirta*, Henderson, Trans. Linn. Soc., Zool. (2) V. 1893, p. 345.

Carapace pyriform, with the regions well-defined and the surface from the base of the rostral spines unevenly granular and tubercular. From the rough surface there stand out (1) at least two good sized spines on either branchial region, (2) a sharp unciform tubercle close to the posterior border near the middle line, and (3) a stout nipple-shaped tubercle near the middle of the pterygostomian region.

The rostral spines, which in both sexes are close together and parallel in more than half their extent, are from one-third (male) to two-sevenths (female) the length of the carapace proper; from the point of origin of the accessory spines, which are situated at the end of the parallel portion, they are elegantly divergent.

The prominent supra-ocular cave has the antero-external angle slightly upturned. The basal antennal joint has a stout spine anteriorly, and a coarse tooth in the middle of its outer border.

The chelipeds are smooth, and are slender in both sexes, but most so in the female: in the male they are equal in length to the post-rostral, in the female to the post-ocular portion of the carapace: the palms are slender and sub-cylindrical, and are twice the length of the fingers, which latter are hardly arched, and are therefore but slightly separated at the base when clenched.

All the ambulatory legs are slender and smooth, and the first pair are considerably the longest, being nearly twice the length of the carapace and rostrum, the dactylus not being abnormally elongate.

The body and legs are covered with a short fine down, and the colour in spirit is usually mottled reddish and yellow.

In the Museum collection are specimens from the Andamans and from Ceylon.

#### *Nazia taurus*, Pocock.

*Nazia taurus*, Pocock, Ann. Mag. Nat. Hist. Vol. V. 1890, pp. 77 and 79.

*Nazia taurus*, Henderson, Trans. Linn. Soc., Zool. (2) V. 1893, p. 346.

Distinguished by the very long and widely divergent rostral spines.

Carapace pyriform, with the regions well-defined, and the surface, from the base of the rostral spines, unevenly granular and tubercular beneath tufts of hair. Among the tubercles three on the gastric region in the middle line, three in a triangle on the intestinal region, and three on either branchial region attract attention.

The rostral spines, which are considerably more than half the carapace in length, are widely divergent—the distance between their tips being more than three-quarters of their length: the accessory spine is situated not far in front of the middle.

The prominent supra-ocular cave has a strong sharp spine, and there is an even stronger and sharper spine at the antero-external angle of the basal antennal joint, as well as a prominent tooth near the middle of the outer border of this joint.

The chelipeds are granular: in the male they are equal in length to the carapace *plus* four-fifths of the rostrum, and, though slender, are considerably stouter than the other legs, especially as to the palm, which is more than twice the length of the fingers—the fingers being but little curved and therefore but little separated when closed: the meropodite has a strong sharp spine at the distal end of its upper border.

The ambulatory legs are slender: the meropodites of all but the last pair are armed as to the distal end of the upper border with a spine, which is of conspicuous size in the case of the first pair. The first pair are markedly the longest, being nearly twice the length of the carapace measured with the long rostrum, and have the dactylus extremely long—nearly equal in length to the propodite.

A single male specimen occurs in the collection, having been dredged off the Andamans in 36 fathoms.

#### *Naxia cerastes*, Ortmann.

*Naxia cerastes*, Ortmann, in Semon, Zool. Forschungsreisen Austral. und Malay. Archipel., Crust., p. 43, taf. iii. fig. 4.

This species appears to be very similar to *Naxia taurus*, with which it may, perhaps, even be identical. It differs from *Naxia taurus*, comparing specimens of the same size and sex, in the following unimportant particulars:—(1) the rostral spines are less divergent; (2) the carapace, in addition to the granules and tubercles, is armed with several large spines, of which three on either branchial region and one on the intestinal region are of conspicuous size, while several in the middle line on the gastric and cardiac regions are hardly smaller.

In the collection are a perfect male and female from the Andamans.

#### *Naxia hystrix*, Miers.

*Naxia hystrix*, Miers, 'Challenger' Brachyura, p. 60, pl. vi. fig. 4.

*Naxia hystrix*, R. I. Pocock, Ann. Mag. Nat. Hist., Vol. V. 1890, p. 79.

*Naxia hystrix*, Ortmann, Zool. Forsch. in Austral. und Malay. Archipel., Crust., p. 43.

Body closely beset with short knobbed hairs, among which longer setæ are interspersed.

Carapace subpyriform, armed with numerous long sharp spines as follows:—four, arranged in a triangle base forwards, on the gastric region; one on the cardiac, and one (very large) on the intestinal region; one on either hepatic region; two or three on either pterygostomian region; and, finally, on either branchial region three dorsal and three lateral: between these large spines some spinules and sharp granules are interspersed. In the male there is a pair of strong spines on the sternum between the chelipeds; and each abdominal tergum has a strong median spine: in the female five parallel rows of spines are found on the ventral surface, three of which belong to the abdominal terga, and one on either side to the sternum.

The rostral spines are short (about one-fifth the length of the carapace in the male, and rather less in the female), and divergent: the accessory spinule is found on their inner margin near the tip.

The basal antennal joint has a sharp spine at its antero-external angle, and a tooth near the middle of its outer margin. The antero-external angle of the prominent supra-ocular eave is surmounted by a sharp spine.

The chelipeds in the female and young male are rather more slender than the other legs, and are a little longer than the carapace and rostrum: the palms are slender and subcylindrical, and are nearly three times as long as the fingers, which are nearly straight and appposable throughout. The ambulatory legs are slender, and have very long slender dactyli: the first pair, which are much the longest, are nearly three times as long as the carapace and rostrum.

In the Museum collection are specimens from the Andaman Sea down to 40 fathoms.

#### CHORILIBINIA, Lockington, Miers.

*Chorilibinia*, Lockington, Proc. Ac. Nat. Sci. Calif., Vol. VII. 1876, p. 69.

*Chorilibinia*, Miers, Journ. Linn. Soc., Zool., Vol. XIV. 1879, p. 45; and 'Challenger' *Brachyura*, p. 45.

*Chlorolibinia*, Haswell, Cat. Austral. Crust., p. 17.

Carapace broadly subpyriform, spinose. Rostrum formed of two spines which are coalescent in their basal half. The commencing orbit, which does not afford much concealment to the fully retracted eye, is formed by a little-prominent supra-ocular eave, and a cupped (and isolated) post-ocular tooth. The basal antennal joint is broad, has its antero-external angle more or less produced, and has also a lobe on its

outer margin, near the base. Merus of the external maxillipeds as broad as the ischium, and with the antero-external angle produced.

Chelipeds slender; ambulatory legs very long and slender. Abdomen of the male consisting of seven distinct segments.

*Chorilibinia andamanica*, n. sp. Plate V. figs. 2, 2a.

Distinguished from *Chorilibinia gracilipes*, Miers (Ann. Mag. Nat. Hist. Vol. IV. 1879, p. 7, pl. iv. fig. 4), (1) by the much less divergent rostral spines; (2) by the pair of great spines—one pointing forwards, the other backwards—on the cardiac region; (3) by the much slenderer chelipeds.

Carapace broadly subpyriform, with (1) a median line of tubercles and spines increasing in size from before backwards, four of the spines—namely one on the after limit of the gastric region, two on the cardiac region, and one near the posterior border—being conspicuously large; and with (2) on either side a supra-marginal line of spines as follows—a tooth at the angle of the buccal frame, a large hepatic spine pointing downwards, and four branchial spines, the last of which directed obliquely backwards is much the largest. Besides these large spines there are numerous, symmetrically disposed, sharp granules. The rostrum, which measured from the anterior border of the orbit is about one-third the length of the carapace proper, ends in two very slightly divergent spines.

The eyes are short and thick; and the orbit is formed by a moderately prominent supra-ocular eave separated by a narrow interval from a broad isolated post-ocular pocket.

The basal antennal joint is moderately broad, and bears two teeth, one at the antero-lateral angle, the other at the base—the latter inclining towards the post-ocular pocket.

The external maxillipeds completely close the buccal frame, the merus being as broad as the ischium.

The chelipeds are not stouter than the legs, and are but little longer than the carapace (rostrum included): the next pair of legs are considerably more than three times, and the third pair are about three times, this length; while the 4th and 5th pairs are very short.

The abdominal segments from the third to the sixth inclusive, are coalescent.

The sternum between the chelipeds carries a pair of very strong sharp teeth.

*Loc.* Andamans.

## EGERIA, Leach.

*Egeria*, Leach, Zool. Miscell. Vol. II. p. 39.

*Egeria*, Milne-Edwards, Hist. Nat. Crust. I. 290.

*Egeria*, Miers, Journ. Linn. Soc., Zool., Vol. XIV. 1879, p. 654; and 'Challenger' Brachyura, p. 44.

Carapace subpyriform, nearly as broad as long, convex and tuberculated. The rostrum consists of two vertically compressed spines of no great length, which are fused together in half or more of their extent. The eyes are short. The commencing orbits are formed by a supra-ocular cave and a post-ocular tooth, the interval between this tooth and the supra-ocular cave above, and between it and the basal antennal joint below, being partly closed in each case by a spine. The basal antennal joint is truncate-triangular; its antero-external angle is produced, and there is a second spine behind the middle of the outer border: the mobile portion of the antenna is visible from above on either side of the rostrum. The merus of the external maxillipeds is as broad as the ischium. Chelipeds in the adult male considerably longer than the carapace and rostrum, and having the palms inflated. Chelipeds in the female very slender throughout, and a little longer than the carapace and rostrum. Ambulatory legs extremely long and slender, the first pair being about six times the length of the carapace and rostrum: the dactylus in all is remarkably long. Abdomen of male seven-jointed: of female five-jointed.

*Egeria arachnoides* (Rumph), Edw.

*Egeria arachnoides*, Rumph, pl. viii. fig. 4; [and Latreille, Encyc. Pl. 281, fig. 1;] and Milne-Edwards, Hist. Nat. Crust., I. 291; and Neumann, Syst. Œbers., 1878, p. 19; and Haswell, P. L. S., N. S. Wales, IV. 1879, p. 439, and Cat. Austr. Crust., p. 11; and Miers Zool. Alert, pp. 182 and 191, and 'Challenger' Brachyura, p. 44; and C. W. S. Aurivillius, Kongl. Sv. Vet. Ak. Handl., XXI. 1888-89, No. 4, p. 44; and Ortmann, Zool. Jahrb. Syst. etc., VII. 1893, p. 48; and J. R. Henderson, Trans. Linn. Soc. Zool. (2) V. 1893, p. 343.

*Cancer longipes*, Herbst, Krabben, I. ii. 231, pl. xvi. fig. 93; and Fabricius Syst. Ent. ii. 466.

*Inachus longipes*, Fabr. Suppl., p. 358.

*Macropus longipes*, Latr. Hist. Nat. Crust. VI. 111.

*Leptopus longipes*, Lamk. Hist. An. Sansvert. V. 235; and Desmarest Consid. Crust. p. 159; [and Guérin, Icon. Reg. An. Crust., pl. x. fig. 3;] and Cuvier, Regne An. Crust., pl. xxxiv. fig. 1; and Adams and White, 'Samarang' Crust., p. 7; and Stimpson, Proc. Ac. Nat. Sci., Philad., 1857, p. 216; and A. O. Walker, Journ. Linn. Soc. Zool., XX. p. 109; and M. J. Rathbun, P. U. S. N. M., XVI. 1893, p. 95.

*Egeria indica*, Leach, Zool. Miscel. II. pl. lxxiii; and Desmarest, Consid. Crust., p. 157, pl. xxvi. fig. 2; and Milne-Edwards, Hist. Nat. Crust. I. 292; and Adams and White, 'Samarang' Crust., p. 6; and E. Nauck, Zeits. Wiss. Zool. XXXIV. 1880, p. 41 (gastric teeth).

*Egeria herbstii*, Milne-Edwards, Hist Nat. Crust. I. 292; and Heller, 'Novara' Crust., p. 4; and Haswell, P. L. S., N. S. Wales, IV. 1879, p. 439, and Cat. Austr. Crust., p. 12.

Our large series of perfect specimens fully supports Mr. Miers' conclusion that all the hitherto described species of *Egeria* may be regarded as identical with the species rather poorly figured in Rumph's *Amboinische Rariteithamer*.

Carapace subpyriform, or, rostrum excluded, subcircular, its breadth being equal to its length behind the base of the eye-stalks: the regions are distinctly delimited, and the surface is uneven and armed with some symmetrically disposed spines and spinules of which the six following are very conspicuously large, namely:—in the middle line, one on the cardiac and one on the intestinal region, and, on either side, a sub-hepatic and a lateral epibranchial: besides these there is (1) a conspicuous set of spinules arranged in the form of a T on the gastric region—the last in the vertical limb of the T being a distinct spine; and (2) two series of distant spinules on either branchial region.

The rostrum varies somewhat: it is always short, and typically, consists of two vertically compressed spines which are fused in rather more than half their extent and have the tips slightly divergent: but sometimes the fusion is more extensive, or the tips are broken, and the rostrum then has the form of an emarginate stump. The supra-ocular eave is surmounted by a small sharp tooth anteriorly.

The chelipeds in the adult male are more than half again as long as the carapace and rostrum: the merus is a little enlarged distally, and the palm is inflated and distally enlarged: the fingers, which are half the length of the palm, are slightly separated at the base when clenched.

The chelipeds in the female are only one-fourth longer than the carapace and rostrum, and are the slenderest of all the trunk-legs.

The first pair of ambulatory legs are at least six times the length of the carapace and rostrum, rather more than a third of their extent being formed by the dactylus: the other legs gradually decrease in length to the fourth and last, which are about  $2\frac{1}{3}$  times the length of the carapace and rostrum. The joints in all are very slender, cylindrical, and except for a spine at the distal end of the upper border of the merus, quite smooth.

Conspicuous on the sternum of the male is a pair of large teeth, placed between the front legs.

The body and legs are usually covered with an excessively short fine down: the legs are often banded, sometimes very distinctly, with dull red.

*Egeria investigatoris*, n. sp.

This species closely resembles *Egeria arachnoides*, adult males being compared, but differs in the following particulars:—(1) the carapace is more nearly circular, owing to the greater convexity of the hepatic and pterygostomial regions; (2) the spines on the carapace, although almost the same in arrangement, are markedly larger; (3) the sternum has a transverse group of spines on every segment; (4) every abdominal tergum except the last has a large median spine; (5) the hiatus between the post-ocular tooth and the basal antennal joint is scarcely affected by a small denticle; (6) the chelipeds in the adult male are  $2\frac{1}{3}$  times the length of the carapace, and have the palm long, very slender, and cylindrical, and the fingers sharply and evenly denticulated all along their appposable edge.

The legs are in fragments, but the joints that remain are extremely long and slender.

Length of carapace and rostrum	...	24 + 5 = 29	millim.
Breadth of carapace	...	24	„
Length of male chelipeds	...	65.5	„

*Loc.* Off Ceylon, 32 fathoms.

## DOCLEA, Leach.

*Doclea*, Leach, Zool. Miscell., Vol. II. p. 41.

*Doclea*, Milne-Edwards, Hist. Nat. Crust. I. 292.

*Doclea*, Miers, Journ. Linn. Soc., Zool., Vol. XIV. 1879, p. 652.

Body and appendages tomentose, usually very densely so.

Carapace circular, armed at the sides, and often on the dorsal surface also, with a few spines.

The rostrum consists of two vertically compressed spines which are fused together in almost the whole of their extent and are usually short: it has hence, usually, the appearance of a short flat emarginate beak, hardly breaking the general outline of the carapace. (In one species—*Doclea tetraptera*—the rostrum is rather long).

The eyes are very small, and the commencing orbits are formed by an acute post-ocular tooth and a little-prominent supra-ocular eave. The antennæ are very short and inconspicuous—not reaching to the end of the short rostrum: the basal joint is short, broadly triangular, the apex forming a sharp tooth: the flagella are almost rudimentary.

The buccal frame is somewhat arched in front. The external maxillipeds have the merus rather broader than the ischium, the antero-external angle being slightly produced.

The chelipeds are short and slender in the female; longer, stout, with an enlarged and inflated palm, in the adult male.



The abdomen consists of seven segments in the male, and of seven in the female of all except *D. muricata* and *hybrida*.

*Key to the Indian species of Doclea.*

- |   |  |   |                 |  |                     |  |
|---|--|---|-----------------|--|---------------------|--|
| I. Pterygostomian regions distinctly canaliculated fore and aft.  | 1. Rostrum elongate—one-fourth to two-fifths the length of the carapace proper, and with the points very widely divaricated: the last lateral and the median posterior spines of huge size.....  | <i>D. tetraptera.</i>   |                 |  |                     |  |
|   | { <table border="0"> <tr> <td>i. Two lateral spines on the branchial region: no median posterior spine.....</td> <td><i>D. ovis.</i></td> </tr> <tr> <td>ii. Three lateral spines on the branchial region, the last being short: a short median posterior spine: no spines on the dorsum of the carapace.....</td> <td><i>D. japonica.</i></td> </tr> </table> | i. Two lateral spines on the branchial region: no median posterior spine..... | <i>D. ovis.</i> | ii. Three lateral spines on the branchial region, the last being short: a short median posterior spine: no spines on the dorsum of the carapace..... | <i>D. japonica.</i> |  |
|   | i. Two lateral spines on the branchial region: no median posterior spine.....  | <i>D. ovis.</i>   |                 |  |                     |  |
| ii. Three lateral spines on the branchial region, the last being short: a short median posterior spine: no spines on the dorsum of the carapace.....  | <i>D. japonica.</i>  |   |                 |  |                     |  |
| 2. Rostrum short—one-sixth the length of the carapace proper— and with no marked divergence of the tips. <table border="0"> <tr> <td>iii. Three lateral spines on the branchial region, the last being, like the postero-median spine, long: a line of tubercles, two of which are usually produced to form spines, down the middle of the carapace.....</td> <td><i>D. canalicifera.</i></td> </tr> </table> | iii. Three lateral spines on the branchial region, the last being, like the postero-median spine, long: a line of tubercles, two of which are usually produced to form spines, down the middle of the carapace.....  | <i>D. canalicifera.</i>   |                 |  |                     |  |
| iii. Three lateral spines on the branchial region, the last being, like the postero-median spine, long: a line of tubercles, two of which are usually produced to form spines, down the middle of the carapace.....   | <i>D. canalicifera.</i>  |   |                 |  |                     |  |
- 
- |  |  |   |                    |  |                     |
|--|--|---|--------------------|--|---------------------|
| II. Pterygostomian regions not canaliculated.  | 1. Carapace discoid: 2nd pair of trunk-legs three to four times the length of the carapace: a single series of tubercles or spines down the middle of the carapace.....  | <i>D. gracilipes.</i>                         |                    |  |                     |
|  | 2. Carapace globular: 2nd pair of trunk-legs hardly twice the length of the carapace: a short series of tubercles or spines on either branchial region parallel to a long mid-dorsal series of tubercles or spines <table border="0"> <tr> <td>i. Tubercles, not spines on the carapace.....</td> <td><i>D. hybrida.</i></td> </tr> <tr> <td>ii. Spines not tubercles, on the carapace.....</td> <td><i>D. muricata.</i></td> </tr> </table> | i. Tubercles, not spines on the carapace..... | <i>D. hybrida.</i> | ii. Spines not tubercles, on the carapace..... | <i>D. muricata.</i> |
| i. Tubercles, not spines on the carapace.....  | <i>D. hybrida.</i>   |   |                    |  |                     |
| ii. Spines not tubercles, on the carapace..... | <i>D. muricata.</i>  |   |                    |  |                     |

*Doclea ovis* (Herbst), Edw.

*Cancer ovis*, Herbst, Krabben, I. ii. 210, tab. xiii. fig. 82; and Fabricius, Syst. Ent. II. 459.

*Inachus ovis*, Fabricius, Supplement, p. 355.

[*Maia ovis*, Bosc. I. 256]; and Latreille, Hist. Nat. Crust. VI. 100.

*Doclea ovis*, Milne-Edwards, Hist. Nat. Crust. I. 294.

*Doclea ovis*, Cuvier, Règne Animal, Crust., pl. xxxiii. fig. 2.

*Doclea ovis*, Adams and White, Zool. 'Samarang.' Crust., p. 7.

*Doclea ovis*, A. O. Walker, Journ. Linn. Soc., Zool., XX. 1890, p. 109.

Body and appendages, except the hands and the tips of the dactyli, covered with an extremely dense soft fur.

Beneath the fur the carapace is almost smooth, its surface being hardly broken by a median line of pimples on the gastric region; but its antero-lateral border, on each side, is armed with four sharp teeth of about equal size—one at the angle of the buccal frame; one, which has sometimes a tubercle at its base, on the sub-hepatic region; and two on the front part of the branchial region. The basal antennal joint has also the form of a tooth, and midway between it and the tooth at the outer angle of the buccal frame is another tooth. So that, including the pointed basal antennal joint, the antero-lateral margin of the carapace shows six teeth: there is no spine, though occasionally a trace of a tubercle, on the posterior border.

The rostrum hardly breaks the general subcircular outline of the carapace: it is cleft at the tip, and, measured at the level of the base of the post-ocular tooth, is broader than long.

The pterygostomian region is longitudinally grooved. The chelipeds in the old male are  $1\frac{1}{4}$  times the length of the carapace and rostrum, and are enlarged, especially as to the palm, which is  $\frac{2}{3}$  as broad as long, and is inflated on the inner side: the fingers also are stout and meet only in (about) the distal third. In the female the chelipeds are only about  $\frac{2}{3}$  the length of the carapace and rostrum, and are throughout slenderer than the other legs. The 2nd pair of trunk-legs (first ambulatory legs) are from twice to  $2\frac{1}{4}$  times the length of the carapace and rostrum.

The abdomen in both sexes consists of seven distinct segments, and the second segment in the female bears a large median elevation.

A common species in muddy waters in the vicinity of the mouths of the large rivers of India.

*Doclea japonica*, Ortmann.

*Doclea japonica*, Ortmann, Zool. Jahrb. Syst., &c., VII. 1893, p. 46, pl. iii. fig. 4.

The only differences between this species and *Doclea ovis* are (1)

that, instead of only two spines on the lateral border of the branchial region, there are *three*, the last being the largest and being placed rather higher up, (so that, including the tooth-like basal antennal joint, there are seven points on the antero-lateral border of the carapace); and (2) that there is a coarse spine, or blunt tooth, on the posterior border of the carapace.

I do not think that these differences are of more than varietal value; for it is not uncommon in *Doclea oris*, after careful denudation, to find traces of tubercles corresponding to the additional spines of *D. japonica*.

In the Museum collection are specimens from the mouth of the R. Hooghly.

### *Doclea canalifera*, Stimpson.

*Doclea canalifera*, Stimpson, Proc. Acad. Nat. Sci., Philad., 1857, p. 217.

Body and appendages, except the fingers and dactylopodites, covered with a dense velvet-like tomentum. Carapace subcircular with a line of tubercles or spines down the middle line, namely, some minute tubercles (only visible on the denuded carapace), followed by a spine, on the gastric region; a larger spine on the cardiac region; and a much larger one still on the posterior border: the antero-lateral border is armed with four spines, the first bounding the outer edge of the pterygostomial canal, the last, which is rather larger than the spine of the posterior border, standing near the middle of the branchiostegal border: in addition, there is a small spine at the outer angle of the buccal frame, but no spine between this and the basal antennal joint; and there is a line of extremely faint tubercles, only visible after complete denudation, stretching obliquely on either side from near the front towards the last epibranchial spine.

The rostrum, which is hardly longer than the breadth between the eyes, is sharply and deeply bifid at tip.

The pterygostomial region is longitudinally grooved. The chelipeds (in the young male) are slenderer than the next pair of legs, and are equal to the length of the carapace between the base of the rostrum and the base of the spine on the posterior border. The second pair of trunk-legs, which are the longest, are a little less than twice the length of the carapace and rostrum.

Abdomen of the male seven-jointed.

In the Museum are specimens from the mouth of the Hooghly and from the muddy estuarine coasts of Orissa and of Arakan.

*Doclea gracilipes*, Stimpson.

*Doclea gracilipes*, Stimpson, Proc. Ac. Nat. Sci., Philad., 1857, p. 216.

*Doclea* sp. De Man, Mergui Crust., Journ. Linn. Soc., Zool., XXII. 1888, p. 13.

*Doclea andersoni*, De Man, op. cit., tom. cit., p. 11, pl. i. fig. 1.

Carapace discoidal, covered, as are also the legs as far only as the end of their merus or carpus, with a short close fur.

Rostrum, measured from the posterior orbital border, sometimes as long as broad and about one-seventh the length of the carapace, sometimes twice as long as broad and about one-fourth the length of the carapace; deeply cleft, the spines sometimes convergent, sometimes almost in contact throughout, sometimes slightly divergent.

Besides a line of four teeth, situated one at the end of the basal antennal joint, one at the angle of the buccal frame, and one behind each of these, the antero-lateral margin is armed with four acute curved claw-like spines, the posterior of which is typically two-fifths to one-third the breadth of the carapace in length, but may sometimes be only one-eighth the breadth of the carapace in length; while the three anterior are typically about one-sixth the breadth of the carapace in length, but may sometimes be merely tubercles.

In the middle of the posterior border is a great spine as large as the last spine of the antero-lateral series.

In the middle line of the carapace is a series of tubercles and spines which are very variable in size: typically only two are prominent, and these have the form of upstanding spines, one in the gastric region, the other—much larger—in the cardiac region. Both of them, however, may be reduced to tubercles, while in front of them and also between them there may or may not be a line of tubercles.

Except for this median line of elevations, the dorsum of the denuded carapace is either smooth, or has only a line of extremely indistinct elevations passing on either side obliquely from near the front towards the great lateral epibranchial spine.

The chelipeds in the female are rather shorter than the carapace: in the male they are rather longer than the carapace, and in the adult male have the palms swollen.

The 2nd pair of trunk-legs are between three and four times the length of the carapace measured from the base of the rostrum to the base of the great median posterior spine.

The two spines on the sternum between the bases of the second pair of legs may be distinct or indistinct.

The abdomen consists of seven distinct segments in both sexes.

In this variable species the constant characters are:—

- (1) the discoid (*i.e.*, non-globose) carapace, with elevations only down the middle line:
- (2) the long slender legs of the second pair.
- (3) the large size of the spine at the external angle of the buccal frame.

In the Museum collection are specimens from the Sandheads, R. Hughli; Mergui; Andamans; and also from Hong Kong, whence the species was originally described by Stimpson.

*Doclea muricata* (Herbst), Edw.

*Cancer muricatus*, Herbst, Krabben, I. ii. 211, tab. xiv. fig. 83; and Fabricius, Ent. Syst. II. 459.

*Inachus muricatus*, Fabricius, Supplement, p. 355.

[*Maia muricata*, Bosc, I. 255.]

*Doclea muricata*, Milne-Edwards, Hist. Nat. Crust. I. 295.

*Doclea muricata*, Adams & White, 'Samarang' Crustacea, p. 8.

*Doclea muricata*, E. Nauck, Zeits. Wiss. Zool., XXXIV. 1880, p. 38, (gastric teeth).

*Doclea muricata*, C. W. S. Aurivillius, Kongl. Sv. Vet. Akad. Handl., XXIII. 1888-89, No. 4, p. 43, pl. iv. fig. 5.

*Doclea muricata*, A. O. Walker, Journ. Linn. Soc., Zool., XX. 1890, p. 109.

*Doclea muricata*, Henderson, Trans. Linn. Soc., Zool. (2) V. 1893, p. 342.

Body and legs, except the hands and dactyli, closely covered with crisp very short velvet.

Carapace subglobular. Rostrum short, distinctly bifid. Besides the spine formed by the basal antennal joint, and two denticles at the outer angle of the buccal frame, the antero-lateral margin is armed with four spines, the last of which, situated near the middle of the branchiostegal border, is considerably the largest. The carapace is traversed fore and aft in the middle line by a row of sharp spines, the last of which, situated on the posterior border, is considerably the largest. Between the median and lateral rows of spines, on the branchial region on either side, are two large spines, one behind the other. There are thus five series of spines upon the carapace, which is otherwise characterized by the distinct delimitation of its regions, and by a sort of festooning of the border between the median and lateral series of regions.

The chelipeds are slender throughout in both sexes, and are hardly equal in length to the carapace measured from the base of the rostrum to the base of the posterior spine: the second pair of trunk-legs are rather more than twice the length of the chelipeds.

The abdomen consists of seven distinct segments in the male; and of four in the female, the 3rd to the 6th being fused.

Of 24 specimens from different parts of India there is not one of great size, nor a single adult female.

I believe that this species is only the young form of *Doclea hybrida*.

*Doclea hybrida* (Fabr.), Edw.

*Inachus hybridus*, Fabricius, Supplement, p. 355.

[*Maia hybrida*, Bosc, I. 256]; and Latreille, Hist. Nat. Crust., VI. 99.

*Doclea hybrida*, Milne-Edwards, Hist. Nat. Crust., I. 294.

*Doclea hybrida*, Adams and White, 'Samarang' Crustacea, p. 7.

*Doclea hybrida*, Bleeker, Recherches Crust. Ind. Archipel., p. 9.

*Doclea hybrida*, De Man, Mergui Crust., Journ. Linn. Soc., Zool., XXII. 1888, p. 9.

*Doclea hybrida*, Henderson, Trans. Linn. Soc., Zool. (2) V. 1893, p. 342.

? *Doclea hybridodea*, Bleeker, Recherches Crust. Ind. Archipel., p. 8.

This species differs from *Doclea muricata*, only in the following characters, which, I think, are merely due to age:—

(1) it is much larger;

(2) the spine of the antero-lateral series is (except in small females) the smallest, and tubercles are found instead of spines on the dorsal surface of the carapace, the tubercles corresponding in number and position with the spines of *D. muricata*;

(3) the chelipeds in the adult male are nearly as long as the carapace and rostrum, and have the hands enlarged.

As in *D. muricata* the female abdomen consists of four segments.

As Fabricius, *loc. cit.*, says of this species compared with *D. muricata*, *vix distinctus videtur*.

We have 29 good specimens from different parts of India, all being large males and egg-laden females. I think that they can only be the adult stage of *Doclea muricata*.

*Doclea tetraptera*, A. O. Walker.

*Doclea tetraptera*, A. O. Walker, Journ. Linn. Soc., Zool., Vol. XX. 1890, p. 114 pl. vi figs. 4-8

Body and legs, except the hands and dactyli, covered with a dense stiff fur, so stiff on the trunk-legs as to give their joints, though cylindrical, a sharply quadrangular or triangular sectional form.

The circular form of the carapace is a good deal obscured by the unusual development of the rostrum and of the lateral-epibranchial and postero-median spines.

The rostrum is from one-fourth to two-fifths the length of the carapace proper, and ends in two widely divaricated spinules.

In addition to the tooth formed by the basal antennal joint, and

to a stout tooth at the angle of the buccal frame, the antero-lateral margin bears four large spines: of these, one, situated on the pterygostomian region, is turned downwards to assist in forming a pterygostomian canal somewhat similar to that of *Doclea canalifera*, etc.: of the other three, which are situated on the branchiostegal region, the last is by far the longest and stoutest—being from one-third to half the length of the carapace—and is directed a little backwards and upwards. Down the middle line of the carapace runs a row of spines, increasing in size from before backwards to the last, which, situated on the posterior border, consists of two branches, one branch directed vertically upwards, the other directed horizontally backwards, the horizontal branch being often half the length of the carapace proper.

On the anterior part of the branchial region, midway between the middle line and the lateral border of the carapace, is a stout spine, visible without any denudation.

The chelipeds in the adult male are equal in length to the carapace and rostrum, and have the hands much broadened, inflated, and very elegantly carinated along the lower border, and the fingers evenly denticulated but not closely apposable in all their extent. In the female the chelipeds are not much more than half as long as the carapace *plus* rostrum and posterior spine, and are rather slenderer than the other legs, the fingers also being closely apposable throughout. In young males, of the size figured by Mr. Walker, the enlargement of the hands is much less marked than in old males.

The second pair of trunk-legs, which are the longest, are from twice to  $2\frac{1}{2}$  times the length of the carapace measured from the base of the rostrum to the base of the great postero-median spine.

The sternum in the male has a pair of sharp teeth on its first segment.

The abdomen in both sexes consists of seven separate joints.

Colours in life: dull chocolate, spines white-tipped, chelipeds ivory tinged with pink, legs brownish pink with bright red dactyli.

This species, of which we have a very fine old male, two younger males of different sizes, an adult female, and a young female, appears to be extremely close to *D. calcitrata*, White (Proc. Zool. Soc., 1847, p. 56; Ann. Mag. Nat. Hist., Vol. XX. 1847, p. 61; and 'Samarang' Crustacea, p. 7, pl. i. fig. 2). It appears to differ from *D. calcitrata* only in the proportions of the legs, which are slender and very long in the last-named species.

It may be mentioned that the rostrum and great spines of the carapace are, judging from the state of two of our specimens, liable to be broken and only very imperfectly repaired again.

Our specimens all came from the vicinity of the mouth of the River Hooghly.

Alliance II. LISSOIDA.

HOPLOPHRYS, Henderson.

*Hoplophrys*, Henderson, Trans. Linn. Soc., Zool., Vol. (2) V. 1893, p. 346.

Carapace subovate (elongate pentagonal), with the regions moderately defined and the surface spinose. The rostrum is composed of two short, flattened, acute, divergent spines. The commencing orbits are formed by a supra-ocular eave which has its antero-external angle very strongly and acutely produced, and which is in close contact with a slightly excavated post-ocular tooth, only a very narrow fissure being left between: below, there is no trace of an orbital floor. The eyes are short, and even when fully retracted the cornea is hardly at all concealed from dorsal view. The basal antennal joint is very acutely triangular, the spinous termination being distinctly visible from above: the very short slender mobile portion of the antenna is exposed. The antero-external angle of the merus of the external maxillipeds forms a foliaceous lobe: the merus therefore is broader than the ischium; the palp is attached to its internal angle. The trunk-legs are strongly spinose: the chelipeds, even in the adult male, are slender, but still differ from those of the female in having the fingers more arched and closely apposable only in the distal half.

The abdomen in the male consists of seven distinct segments; but in the female of only five—the fourth to the sixth being fused together.

*Hoplophrys oatesii*, Henderson.

*Hoplophrys oatesii*, Henderson, Trans. Linn. Soc. Zool., 1893, p. 347, pl. xxxvi. figs. 1-4.

The gastric region of the carapace is prominent, with two curved rows of spines, the front row (convex anteriorly) consisting of seven spines of which the middle one is the largest, the back row (slightly convex posteriorly) consisting of three spines of which the middle one—the largest of all the spines on the gastric area—is compressed laterally. On the cardiac area, as well as on the gastric area, are two spines placed side by side. On either branchial area are three spines arranged in a triangle, of which the anterior is the largest of all the spines on the carapace, while the most external, which occupies the lateral epibranchial angle, is the most acute and is also unequally bifid. There are also two or three spinules on the hepatic area. Between the



spines the surface is perfectly smooth and polished, although there are some tufts of stiff clean hairs.

The rostrum, which consists of two very acute and slightly divergent teeth, is about one-fourth the length of the carapace proper.

The supra-ocular eave is produced forwards as a very acute spine, the base of which is surmounted by a secondary spine. The cornea is surmounted by a spinule.

The chelipeds have the merus slightly, and the carpus strongly spiny, and are equal to the carapace (without the rostrum) in length: they are almost alike in the adults of both sexes, the fingers only of the male differing from those of the female in being closely apposable only in the distal half, instead of throughout. The ambulatory legs, which are about equal to the chelipeds and to one another in length, have the merus carpus and propodite spiny, and the dactylus stout, claw-like, and denticulated on part of the posterior margin.

In the Museum collection are an adult male and an egg-laden female taken by myself, off the Ganjam Coast in 15-25 fms., from a colony of *Spongodes*. The *Spongodes* which belongs to a species (I think new) intermediate in character between *S. cervicornis* and *S. pustulosa*, W. and S., is one of those with a brilliant white ctenosarc and pink zooids, so that the crabs with their porcelain-white bodies, pink spines, and pink-banded legs were with difficulty detected.

Dr. Henderson considers the above species to be closely related to *Schizophrys* and *Microphrys*, but it appears to me to be much more closely related to *Pisa* and *Tylocarcinus*.

#### TYLOCARCINUS, Miers.

*Tylocarcinus*, Miers, Journ. Linn. Soc., Zool., Vol. XIV. 1879, p. 664. (*Pisa*, Latr. part.; *Pisa*, Edw. part.; *Milnia*, Stimpson part.; *Microphrys*, Edw. part.)

Carapace tuberculated, pyriform, without lateral spines. The rostrum consists of two slender slightly divergent spines.

The eye-stalks are short and are retractile, but not to such an extent as to completely conceal the cornea. The commencing orbits are formed by a supra-orbital eave, the anterior angle of which is produced forwards as a spine roughly parallel with the rostrum, and of a strongly cupped post-ocular process which, instead of being isolated, is in the closest contact above with the supra-ocular eave and below with the basal antennal joint. The basal antennal joint, which is of no great breadth, has its antero-external angle produced to form a sharp tooth, which is not visible from above: the mobile portion of the antenna, which is short, is completely exposed.

The external maxillipeds have the merus as broad as the ischium, and the palp attached to the internal angle of the merus.

The chelipeds in the adult male are somewhat stouter than the other legs, have the palm short and enlarged, and the fingers arched and meeting only at tip: in the female they are slenderer than the other legs, have the palm slender, and the fingers closely apposable throughout. The ambulatory legs are stout, and have the dorsal surface sharply nodose or coarsely spinose.

The abdomen in both sexes consists of seven distinct segments.

This genus, which appears to me to be but slightly distinct from *Pisa* (e.g., *Pisa corallina*), Riss., shows the transition towards *Tiarinia* in the next group.

That it should be grouped with *Tiarinia* and *Macrocoeloma*, as it is by Miers (*loc. cit.*), I cannot agree, since *Tiarinia* has complete orbits and an enormously broad basal antennal joint, which *Tylocarcinus* has not.

The type of *Tylocarcinus*, namely *T. styx* (Herbst) = *Microphrys styx* A. Milne-Edwards, is placed by the latter author (*Nouv. Archiv. du Mus.*, VIII. 1872, p. 247) between *Picrocerus* and *Oriocarcinus* on the one hand and *Hyastenus* on the other; and this seems to me to be a very natural position.

#### *Tylocarcinus styx* (Herbst).

*Cancer styx*, Herbst, Krabben, III. iii. 53, pl. viii. fig. 6 ("nur klein").

[*Pisa styx*, Latr. Encyc., X. 141.]

*Pisa styx*, Milne-Edwards, Hist. Nat. Crust. I. 308.

*Arctopsis styx*, Adams and White, 'Samarang' Crust., p. 10; and A. Milne-Edwards, in Maillard's L'île Reunion, Annexe F, p. 6.

*Milnia styx*, Stimpson, Ann. Lyc. Nat. Hist. New York, Vol. VII. 1862, p. 180.

*Microphrys styx*, A. Milne-Edwards in Archiv. du Mus. VIII. 1872, p. 247, pl. xi. fig. 4.

*Tylocarcinus styx*, Miers, Ann. Mag. Nat. Hist. 1879, Vol. IV. p. 14.

*Pisa styx*, Richters, Möbius, Meeresf. Maurit., p. 141.

*Tylocarcinus styx*, de Man, Notes Leyden Mus., Vol. III. 1881, p. 94; and Archiv. fur Naturges. LIII. 1887, p. 228; and Ortmann, Zool. Jahrb. Syst. etc. VII. 1893, p. 62; and Henderson, Trans. Linn. Soc., Zool., 1893, p. 349.

Carapace subpyriform and covered with rounded tubercles, among which the following are distinct:—two in the inter-orbital space; four in a transverse series on the front part of the gastric region, followed by three in a triangle; one in the groove between the gastric and cardiac regions, and three in a triangle on the latter region; two, side by side, on the intestinal region; and three on the posterior margin. Besides these there are several on either hepatic region, and many on the branchial regions.

The rostrum, which is between one-third and one-fourth the length of the carapace proper, consists of two divergent spines fused together at the base and slightly incurved towards the tip. The anterior angle of the supra-ocular eave is produced forwards as a sharp spine.

The chelipeds in the adult male are equal to the length of the carapace behind the bifurcation of the rostral spines: they are hardly stouter than the other legs, except as to the palm, which is short and inflated: the fingers, which are three-fourths the length of the palm, are strongly arched, and meet only at the tip.

In the female the chelipeds are not quite as long as the post-orbital portion of the carapace, are slenderer than the other legs, and have the palm slender and the fingers closely apposable throughout.

The ambulatory legs are short and stout: the first pair, which are considerably the longest, are rather longer than the carapace and rostrum: the merus and carpus in all are nodose on the dorsal surface, and the dactyli are strong and claw-like: always in the first pair, and sometimes in the succeeding pairs, the merus has a row of coarse spines along its front margin, and the carpus a single stout spine.

Herbst's figure is either a young male, or, more probably, a female. The figure given by A. Milne-Edwards (*loc. cit.*) is very correct; but I do not see how Miers, who cites this figure with affirmation, can call the chelipeds in the male slender: they are, like the other legs, stout, and the hands are distinctly massive.

In the Museum collection are specimens from Ceylon, from the Andamans, and from Mergui; as well as an adult male and female from Samoa obtained from the Museum Godeffroy.

#### Sub-family IV. MAJINÆ.

Eyes either (1) with orbits, which are either incomplete or complete, but are always complete enough to entirely conceal the cornea, when fully retracted, from dorsal view; or (2) but partially protected by a huge horn-like or antler-like supra-ocular spine, or by a large jagged post-ocular tooth, or by both.

The orbit in the first case is formed in one of two ways: there is always an arched supra-ocular eave, and a prominent post-ocular spine; and either the interval between the eave and the spine is filled by an intermediate spine which completes the orbital roof; or the supra-ocular eave and the post-ocular process are in close contact with one another, and with a process of the basal antennal joint below, so as to more or less complete the floor also of the orbit.

The basal antennal joint is always very broad, and either has its outer angle produced to aid in forming the floor of the orbit, or is armed distally with one or two large spines.

The external maxillipeds have the merus as wide as or much wider than the ischium, and the palp inserted at the antero-internal angle of the merus.

The rostrum is formed of two spines, which may be horizontal, semi-deflexed, or completely deflexed; in the last case the spines are usually more or less fused together.

The ambulatory legs are of no great length.

*Key to the Indian genera.*

- |  |   |   |  |
|--|---|---|--|
| <p><b>Alliance 1. MAIOPID.</b><br/>A.—Carapace either regularly pyriform or sub-circular: rostral spines horizontal: orbits incomplete below; but fairly well roofed in above (1) by a supra-ocular eave, which has at least its postero-external angle produced, (2) by a post-ocular spine, and (3) by a spine intercalated between (1) and (2).</p> | <p>1. Supra-ocular eave and intermediate spine very prominent: eye-stalks slender and curved, with the cornea elongate and occupying a position more ventral than terminal.</p>   | <p>i. The antennular flagellum springs, or appears to spring, from within the orbit.....</p> <p>ii. The antennular flagellum arises quite clear of the orbit.....</p>   | <p><b>MAIA.</b></p> <p><b>PARAMITHRAX.</b><br/>[CHLORINOIDES.]</p> |
|  | <p>2. Supra-ocular eave and intermediate spine distinct, but not very prominent: eye-stalks stout, with rounded cornea which occupy a position as much terminal as ventral.</p>   | <p>i. Carapace pyriform: rostral spines of considerable length, and with one or more accessory spines on the outer surface.....</p> <p>ii. Carapace sub-circular: rostral spines simple, and so short as to hardly break the general outline of the carapace.....</p> | <p><b>SCHIZOPHREYS.</b></p> <p><b>CYCLAX.</b></p>                  |
|  | <p><b>Alliance 2. STENOCIONOPOIDA.</b><br/>—Carapace pyriform, often broadened anteriorly: the orbits either have the form of long semitubular antlers which sheathe the eye-stalk, but do not protect the eye, the cornea in retraction being protected by the base of an extremely long and prominent, isolated, post-ocular horn; or are reduced to the form of long outstanding horns similar to those of the rostrum: eye-stalks extremely long: the external maxillipeds have the external angle much produced: the rostrum consists of two long horns.</p> | <p>1. Orbits in the form of huge semi-tubular antlers followed by a long isolated post-ocular tooth: rostrum vertically deflexed: buccal frame much broader in front than behind.</p>   | <p><b>CRIOCARCINUS.</b></p>  |
|  |   | <p>2. Orbits in the form of long outstanding horns similar to those of the rostrum, which is not deflexed, buccal frame quadrangular.....</p>   | <p><b>STENOCIONOPS.</b></p>  |

- Alliance 3. PERICER-  
OIDA. — Carapace-  
usually broadened  
anteriorly by the  
outstanding or-  
bits: the orbits  
are either nearly  
or quite complete  
above and below,  
being formed by  
a strongly-arched  
supra-ocular eave  
in close contact  
with an excavated  
post-ocular lobe,  
a process of the  
basal antennal  
joint filling in the  
floor below.
- 1. Carapace oblong: rostrum broadly la-  
minar, vertically or nearly vertically  
deflexed: orbits complete, but shallow.. MICIPPA.
  - 2. Carapace subcylindrical, the rostrum  
along with the front part of the gastric  
region vertically deflexed..... CYPHOCARCINUS.
  - 3. Carapace more or  
less pyriform: ros-  
tral spines distinct  
from the base, ho-  
rizontal or slightly  
deflexed: orbits in  
the form of out-  
standing tubes  
which completely  
ensheath the eyes.
    - i. Rostral spines di-  
vergent..... MACROCOELOMA.
    - ii. Rostral spines  
parallel and close-  
ly approximated  
throughout their  
extent..... TIARINIA.

## Alliance I. MAIOIDA.

## MAIA (Lamk.) Edw.

[*Maia*, Lamarck, Syst. Anim. sans verteb. V. 154 (*partim*).]

*Maia*, Latreille, Hist. Nat. Crust. VI. 87 (*partim*).

*Maia*, Desmarest, Consid. Gen. Crust., p. 143.

*Maia*, Milne-Edwards, Hist. Nat. Crust., I. 325.

*Maia*, Miers, Journ. Linn. Soc., Zool., Vol. XIV. 1879, p. 655.

Carapace pyriform, with the regions indistinct, the surface closely granular or spinular, and the lateral borders usually armed with large spines. The rostrum consists of two rather short, straight, divergent spines. The basal joint of the antennæ is broad, and has both the antero-external and antero-internal angle produced to form spines: the mobile portion of the antenna, which appears to spring from within the orbit, is completely exposed. The eye-stalks are long and curved, and bear the cornea chiefly on their ventral surface. The orbit is formed by a prominent supra-ocular eave which has its postero-external angle produced, by a sharp post-ocular spine, and by another spine between these two: the eyes are completely concealed from dorsal view when retracted. The external maxillipeds have the merus as broad as the ischium, the palp being attached to the antero-internal angle of the merus.

The chelipeds are slender, with cylindrical joints and styliform fingers. The ambulatory legs decrease very gradually in length: the first pair are not much longer than the carapace and rostrum: the dactyli of all are styliform.

The abdomen in both sexes consists of seven distinct segments.

*Maia spinigera*, de H.

*Maia spinigera*, de Haan, Faun. Japon. Crust., p. 93, pl. xxiv. fig. 4.

*Maia spinigera*, Adams and White, 'Samarang' Crustacea, p. 15.

*Maia spinigera*, Dana, U. S. Expl. Exped. Crust., pt. I. p. 85.

*Maia spinigera*, Ortmann, Zool. Jahrb. Syst. &c., VII. 1893, p. 51.

Carapace armed with long spines along the antero-lateral borders, down the median line, and in an oblique series on either branchial region joining the median to the antero-lateral series. Excluding the pre-ocular and post-ocular spines and the spines between them, there are four large spines on the antero-lateral border: and there are three large spines in an oblique series on either branchial region. In the middle line of the carapace there are in the gastric region two spines, in the anterior cardiac one, in the post-cardiac one, in the intestinal one, and on the posterior border a pair. Between these large spines the surface of the carapace is sharply, finely, and evenly granular.

The rostrum consists of two moderately divergent spines, the length of which is about one-fourth that of the carapace.

The chelipeds are smooth and very slender, and are rather shorter than the 2nd pair of trunk-legs: the latter, which are the longest of all, are about one-sixth longer than the carapace and rostrum. The merus of all the ambulatory legs has a strong spine at the distal end of its upper border: all the joints of all the ambulatory legs are covered with long hairs.

In the Museum collection is a single specimen from the coast of Beluchistán.

*Maia gibba*. n. sp. Plate IV. fig. 5.

Very near *Maia miersii*, Walker (J. L. S., Zool., Vol. XX. 1890, p. 113, pl. vi. figs. 1-3).

Distinguished (1) by the globose inflation of the posterior (branchiostegal) part of the closely and crisply tubercular carapace, and by the corresponding declivity of the anterior part, giving the animal a hunch-backed appearance; (2) by the absence of large marginal spines on the carapace.

Carapace remarkably swollen in its posterior part, where its greatest breadth is from about three-fourths (♂) to seven-eighths (♀) its extreme length with the rostrum; and closely covered with sharp piliferous tubercles, which, in the male, but hardly in the female, become spinular in the middle line and along the lateral borders.

The rostrum, which, like the anterior part of the carapace, is somewhat declivous, ends in two acute divergent hairy spines, which in the

male are about one-sixth, in the female about one-eighth, the rest of the carapace in length. The eyes and orbits are just as in *M. squinado* (with specimens of which this species has been compared), only the cornea is relatively very much larger, and almost entirely ventral, in the present species, and the spine between the spine of the pre-orbital-hood and the post-orbital spine is nearly as large as either of these.

The antennæ are in all respects as in *M. squinado*, except that the basal joint is slightly narrower.

The appendages are just as in *M. squinado*—the legs being short and hairy and the chelipeds smooth and polished—with the single difference that the chelipeds are only as long as, and are much slenderer than the *fifth* pair of legs, and are therefore very much shorter than the second pair, which hardly exceed the carapace and rostrum in length.

		Male.	Female.
Length of carapace	... ..	32 millim.	41 millim.
Greatest breadth of carapace	... ..	25 "	35 "
Length of chelipeds	... ..	24 "	31 "
" " 2nd pair of trunk-limbs	... ..	33.5 "	46 "

*Loc.* Andaman Sea, 250 fms.

#### PARAMITHRAX, Edw.

*Paramithrax*, Milne-Edwards, Hist. Nat. Crust. I. 323.

*Paramithrax* (*Paramithrax* et *Leptomithrax*), Miers, Journ. Linn. Soc. Zool., Vol. XIV. 1879, pp. 655 and 656.

*Acanthophrys* (partim), A. Milne-Edwards, Ann. Soc. Ent. Fr. (4) V. 1865. p. 140.

*Chlorinoides*, Haswell *infra*; and Miers *infra*.

#### Sub-genus CHLORINOIDES, Haswell.

*Chlorinoides*, Haswell, P. L. S., N. S. Wales, Vol. IV. 1879, p. 442; and Ann. Mag. Nat. Hist., Vol. V. 1880, p. 146; and Cat. Austral. Crust., p. 17.

*Chlorinoides*, Miers, 'Challenger' Brachyura, p. 51.

Carapace pyriform, convex, with the regions indistinct; armed with some very large acute spines. The rostrum consists of two long slender divergent horns. The basal antennal joint is just as in *Maia*, but the mobile portion of the antenna has no connexion with the orbit. The eyes and orbits are as in *Maia*, but the supra-ocular hood has its anterior angle as well as its posterior angle produced into a spine. The external maxillipeds are as in *Maia*, as are also the ambulatory

legs. The chelipeds however differ, at any rate in the male, in which sex they are stouter than any of the other legs, have the palms enlarged, and the fingers arched and meeting only at the tips, which are not excavated.

The abdomen in both sexes consists of seven distinct segments.

As Miers has pointed out ('Challenger' Brachyura, p. 52), *Chlorinoides* may be regarded as a sub-genus of *Paramithrax*, and is also closely connected with *Acanthophrys aculeatus* A. Milne-Edwards (Ann. Soc. Ent. Franc. (4) V. 1865, p. 140, pl. iv. fig. 4). According to Miers, with whom I entirely agree, if *Acanthophrys aculeatus* is the type of the genus *Acanthophrys*, then *Chlorinoides* is synonymous with *Acanthophrys*.

*Paramithrax (Chlorinoides) aculeatus*, (Edw.).

*Chorinus aculeata*, Milne-Edwards, Hist. Nat. Crust. I. 316.

*Chorinus aculeatus*, Adams and White 'Samarang,' Crust., p. 13.

*Paramithrax (Chlorinoides) aculeatus*, var. *armatus*, Miers, Zool. H. M. S. 'Alert,' pp. 182 & 193, pl. xviii. fig. A.

*Chlorinoides aculeatus*, Miers, 'Challenger' Brachyura, p. 53.

*Chorinus aculeatus*, C. W. S. Aurivillius, Kongl. Sv. Vet. Akad. Handl., Bd. XXIII. No. 4, p. 38, pl. ii. fig. 7.

*Chlorinoides aculeatus*, Henderson, Trans. Linn. Soc., Zool., 1893, p. 345.

Carapace pyriform, convex, smooth, armed with five huge thorn-like spines down the middle line, and with two even larger spines on the branchial region: there are also, on either pterygostomian region, two oblique crests, the anterior with three or four teeth—two of which are visible in a dorsal view—the posterior with one or two.

The rostrum consists of two large divergent horns, the length of which is considerably more than half that of the carapace proper.

The orbit consists of a supra-ocular hood, the angles of which (especially the anterior) are strongly produced, of a bilobed post-ocular tooth, and of a long spine filling the interval between the two, just as in *Maia spinigera*. The basal antennal joint, as in most of the forms included in this group, has a strong spine at its antero-external, and another at its antero-internal angle.

The chelipeds in the female are slender, and are only equal to the post-rostral portion of the carapace in length: as in the male, the merus has its crest-like upper and lower edges sharply scalloped and the carpus is cristate above. In the male the chelipeds are stouter than the other legs, especially as to the palm, which is considerably enlarged. The ambulatory legs decrease gradually in length from the 1st pair, which are equal in length to the carapace plus two-thirds of the rostrum: the merus in the first two pairs has a very strong spine at the



distal end of its upper border ; but this in the case of the last two pairs is often reduced to a tubercle.

The body and legs in this species are somewhat hairy and are more or less encrusted with sponges, zoophytes, polyzoa, etc.

In the Museum collection are specimens from the Arakan Coast, Mergui, and Ceylon.

*Paramithrax (Chlorinoides) longispinus* (de Haan).

*Maja (Chorinus) longispina*, de Haan, Faun. Japon., Crust., p. 94, pl. xxiii. fig. 2.

*Chorinus longispina*, Adams and White, 'Samarang' Crust., p. 12.

*Paramithrax (Chlorinoides) longispinus*, Miers, Zoology H. M. S. 'Alert,' pp. 517 and 522.

*Chlorinoides longispinus*, Miers, 'Challenger' Brachyura, p. 53.

*Chlorinoides longispinus*, A. Ortmann, Zool. Jahrb. Syst., etc., VII. 1893, p. 53.

This species differs from *P. aculeatus* in the following constant characters :—

- (1) it is a much smaller species ;
- (2) all the spines, including the rostral spines, are elegantly knobbed at tip ;
- (3) in the median line of spines the third—the one on the cardiac region—is cleft transversely into two from the base ;
- (4) the two oblique dentate ridges on the pterygostomian region are present, but the outermost tooth on the front ridge is produced to form a long spine ;
- (5) the spine at the anterior angle of the supra-ocular hood is similar in size, form, and direction to the other large spines of the carapace ;
- (6) the rostral spines are less than half the length of the carapace ;
- (7) the antero-external angle of the basal antennal joint is produced to form, not a spine, but an elegantly curved foliaceous lobe ;
- (8) the meropodites of all the ambulatory legs have the terminal spine distinct and knobbed at the tip.

This species commonly encrusts itself with a very regular plate-armour of Orbitolites and rounded fragments of Nullipore, etc.

In the Museum collection are good series from off Ceylon 33–34 fathoms, from the Andaman Sea down to 41 fathoms, and from the Madras Coast.

## SCHIZOPHRYS, White.

*Schizophrys*, White, Ann. Mag. Nat. Hist., Vol. II. 1848, p. 282.

*Schizophrys*, Miers, Journ. Linn. Soc., Zool., Vol. XIV. 1879, p. 660 (*et synonym.*); and 'Challenger' Brachyura, p. 66.

*Dione*, de Haan, Faun. Japon. Crust., p. 82.

Carapace broadly pyriform, with the surface granular and the lateral margins strongly spinate. The rostrum consists of two short stout slightly incurved spines, the outer border of which carries one or two accessory spines. The orbit is formed by a little prominent supra-ocular cave, and a sharply bilobed post-ocular tooth, with a broad spine in the interval between the two: the eye-stalks are stout and the cornea terminal, not ventral, in position. The basal antennal joint is somewhat narrowed anteriorly, and ends in two sharp spines—as in the genera immediately preceding: the mobile portion of the antenna is freely exposed. In the external maxillipeds the merus is rather broader than the ischium, and the palp is attached to the antero-internal angle of the merus.

The chelipeds have the merus and carpus granular or spiny; the palm long, smooth and slender; and the fingers longitudinally channelled in their distal half—this being specially marked in the adult male, in which also the chelipeds are longer and stouter than the other legs.

The ambulatory legs are stout, have cylindrical joints, and decrease gradually in length.

The abdomen in both sexes consists of seven distinct segments.

*Schizophrys aspera*, (Edw.)

*Mithrax asper*, Milne-Edwards, Hist. Nat. Crust., I. 320; and Dana, U. S. Expl. Exp. Crust., pt. I. p. 97, pl. ii. figs. 4 a-b.

*Schizophrys aspera*, A. Milne-Edwards, Nouv. Archiv. du Mus. VIII. 1872, p. 231, pl. x. fig. 1; and Haswell, Proc. Linn. Soc., N. S. Wales, Vol. IV. 1879, p. 417; and Cat. Austr. Crust., p. 22; and Miers, Zool. H.M.S. 'Alert,' pp. 182 and 197, and 'Challenger' Brachyura, p. 67; and De Man, Archiv. fur Naturgesch., LIII. 1887, p. 226, and Journ. Linn. Soc., Zool., Vol. XXII. 1888, p. 20; and C. W. S. Aurivillius, Kongl. Sv. Vet. Akad., Handl. XXIII. 1888-89, No. 4, p. 51; [and Cano, Boll. Soc. Nat., Napol., III. 1889, p. 179]; and A. O. Walker, Journ. Linn. Soc., Zool., Vol. XX. 1890, pp. 109 and 113; and Ortmann, Zool. Jahrb. Syst., etc., VII. 1893, p. 57; and J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 346; and Mary J. Rathbun, Proc. U. S. Nat. Mus., Vol. XVI. 1893, p. 91.

*Schizophrys serratus*, White, P. Z. S., 1847, p. 223, fig.; and Ann. Mag. Nat. Hist., Vol. II. 1848, p. 283, fig.; and Adams and White, 'Samarang' Crust., p. 16.

*Schizophrys spiniger*, White, *ll. cit.*; and Adams and White *loc. cit.*; and ? Kossmann, Reise Roth. Meer., Crust., p. 15.

*Maja (Dione) affinis*, de Haan Faun. Japon. Crust., p. 94, pl. xxii. fig. 4; and Adams and White, 'Samarang' Crust., p. 15; and Stimpson, Proc. Ac. Nat. Sci., Philad., 1857, p. 218.

*Mithrax spinifrons*, A. Milne-Edwards, Ann. Soc. Ent., France, (4) VII. 1867, p. 263.

*Mithrax affinis*, F. de B. Capello, Journ. Sci., Lisbon, 1870-71, p. 264, pl. iii. figs. 4, 4a.

*Mithrax* (*Schizophrys*) *affinis*, *triangularis* (et varr. *excipe* var. *dichotoma*) Kossmann, Reise Roth. Meer., Crust., pp. 11 and 13; and *Schizophrys triangularis* var. *indica*, Richters, Möbius, Meeresf. Maurit., p. 143, pl. xv. figs. 8-14.

Carapace pyriform, its greatest breadth about  $\frac{9}{10}$  its length behind the point of bifurcation of the rostral spines, its surface closely and unevenly granular, with scattered sharp tubercles in addition. Exclusive of the large unequally-bifid post-ocular spine, the antero-lateral border is armed with six equidistant spines, the last of which is the smallest and is situated on a rather higher level than the others: the posterior border proper is generally beaded, and has its angles produced and upturned.

The rostrum consists of two stout parallel or incurved spines, the length of which is from one-fifth to one-sixth that of the carapace proper, and the outer border of each of which carries a strong accessory spine.

The basal antennal joint ends in two stout spines, and there is a spine on the sub-hepatic region outside the angle of the buccal frame, and a sharp denticle in the middle of the inferior border of the orbit.

The chelipeds vary: in both sexes the palm is long — twice the length of the fingers — smooth, polished, and either quite unarmed, or armed, at the near end of the upper border, with a spine or with two or three denticles; and in both sexes the merus and carpus are either spiny or granular.

But whereas in old males the chelipeds are stouter than any of other legs, are more than half again as long as the carapace and rostrum and nearly half again as long as the 2nd pair of legs, and have deeply channelled fingers that meet in less than their distal half; in females and young males they are not stouter than the other legs, are not quite equal in length to the carapace and rostrum or to the second pair of legs, and have the fingers less deeply channelled, and apposable in at least half their extent.

The ambulatory legs decrease very gradually in length: they have short claw-like dactyli, and the merus is armed at the far end of the upper border with a spine or tubercle. The body and legs are hairy, and the animal frequently protects itself with flat pieces of Nullipore, &c.

In the collection is a large series of specimens from all parts of the Indian coast, from Mergui and Tavoy on the East to Karachi on the West.

*Schizophrys dama*, (Herbst.)

*Cancer dama*, Herbst, Krabben, III. iv. p. 5, tab. lix. fig. 5.

*Mithrax dama*, Milne-Edwards, Hist. Nat. Crust., I. 319.

*Mithrax* (*Schizophrys*) *dama*, Kossmann, Reise Roth. Meer., Crust., pp. 11 and 13.

This species differs constantly from *Schizophrys aspera* in the following particulars:—

- (1) the carapace is much more elongate, its greatest breadth being only about  $\frac{3}{4}$  its length behind the point of bifurcation of the rostral spines;
- (2) the rostrum is rather longer, and has two accessory spines on its outer border;
- (3) there is no (ventral) spine on the sub-hepatic region;
- (4) the surface of the carapace is more closely and evenly, but more bluntly, granular.

The specimens in the Museum collection come from the Straits of Malacca.

CYCLAX, Dana.

*Cyclax*, Dana, U. S. Expl. Exp., Crust., pt. I. p. 99.

*Cyclomaia*, Stimpson, Amer. Journ. Sci. and Arts, Vol. XXIX. 1860, p. 133; and A. Milne-Edwards, Nouv. Archiv. du Mus., VIII. 1872, p. 235 (*et synon.*)

*Cyclax* (*Cyclax* and *Cyclomaia*), Miers, Journ. Linn. Soc., Zool., Vol. XIV. 1879, p. 660.

This genus differs from *Schizophrys*, from which, perhaps, it ought not to be separated, only in the form of the carapace, and in the degradation and shortening of the rostrum, with which is correlated a shortening and broadening of the basal antennal joint. (In one species the legs are slender). The carapace is subcircular; the rostrum obsolescent and bifid; the basal antennal joint very short and broad, and armed with a third spine—a very small one, situated on the outer margin.

*Cyclax* (*Cyclomaia*) *suborbicularis*, (Stimpson).

*Mithrax suborbicularis*, Stimpson, Proc. Ac. Nat. Sci., Philad., 1857, p. 218.

*Cyclax spinicinctus*, Heller, Crust. Roth. Meer, in SB. Ak., Wien, XLIII. i. 1861, p. 304, tab. i. figs. 7-8; and Richters, in Möbins, Meeresfauna Maurit., p. 144.

*Cyclomaia margaritata*, A. Milne-Edwards, Nouv. Archiv. du Mus., VIII. 1872, p. 236, pl. x. figs. 2-3; and Haswell, P. L. S., N. S. Wales, Vol. iv. 1879, pp. 441, and Cat. Austral. Crust., p. 21.

*Cyclomaia suborbicularis*, Ortmann, Zool. Jahrb., Syst., etc., VII. 1893, p. 58.

[*Cyclomaia margaritata*, F. Muller, Verh. Ges., Basel, VIII. p. 473.]

Carapace subcircular, its surface closely beaded, with some larger spinules regularly interspersed: the lateral margin is armed with six

large spines (exclusive of the large curved unequally-bifid post-ocular spine) the first of which is often bifid: close to the posterior margin, in the middle line, is a pair of smaller spines.

The rostrum consists of two triangular teeth, which although broader are not longer than the spines of the lateral margin.

The eyes are of moderate length and are retractile into orbits formed, as in *Schizophrys*, *Maia*, etc., of a supra-ocular eave, a large post-ocular spine, with another spine in the interval between the two: the supra-ocular eave has its angles slightly produced and spiniform.

The broad short basal antennal joint ends in two stout teeth, and has a third denticle on its outer margin.

The chelipeds in the female and young male are slightly more slender than the other legs, and are as long as the carapace or as the 2nd pair of trunk-legs *minus* the dactylus: they have a long slender smooth palm, nearly twice the length of the fingers. The ambulatory legs are hairy, have short claw-like dactyli, and decrease gradually in length.

In the Museum collection are specimens from the Madras coast and from the Andamans.

## Alliance II. STENOCIONOPODA.

### CRIOCARCINUS, Edw.

*Criocarcinus*, Milne-Edwards, Hist. Nat. Crust., I. 331.

*Criocarcinus*, Miers, Journ. Linn. Soc., Zool., Vol. XVI. 1879, p. 661.

Carapace shaped and armed much as in *Chlorinoides*, but with the hepatic regions concave as in *Micippe*. The rostrum consists of two curved almost vertically deflexed spines, which are fused together in their basal half. The eye-stalks are slender and of extreme length. The orbit is formed of a semi-tubular branching supra-ocular hood which encloses the eye-stalk, and of a long slender post-ocular spine, against the base of which the eye is retractile: the supra-ocular hoods have the appearance of a pair of antlers. The basal antennal joint is broad, and has a strong spine at either anterior angle: the mobile portion of the antenna is freely exposed.

The buccal frame is narrow behind and broad in front, as in *Micippe*; and the merus of the external maxillipeds is broader than the ischium, and carries the palp at its deeply-notched internal angle.

The chelipeds are shorter, and in the male somewhat stouter but in the female somewhat slenderer, than the other trunk-legs, which again are of no great length and decrease gradually from the 2nd pair.

The abdomen consists of seven distinct segments in the male, of five in the female.

*Criocarcinus superciliosus* (Herbst), Guérin, Edw.

Seba, III. xviii. 11: Linnæus, Syst. Nat., I. 2, 1047, No. 45.

*Cancer superciliosus*, Herbst, Krabben, I. ii. 227, tab. xiv. fig. 89.

*Criocarcinus superciliosus*, Guérin, Voy. Coquille, Zool., Vol. II. Crust., p. 19.

*Criocarcinus superciliosus*, Milne-Edwards, Hist. Nat. Crust., I. 332.

*Criocarcinus superciliosus*, A. Milne-Edwards, Nouv. Archiv. du Mus., VIII. 1872, p. 242, pl. xii. fig. 3.

*Criocarcinus superciliosus*, Kossmann, Reise Roth. Meer., Crust., p. 10, tab. iii. fig. 6 (*vide synon.*).

Carapace pyriform, broadened anteriorly by the antler-like "orbits," with the hepatic regions sunken, and the other regions fairly distinct: in addition to numerous pearly tubercles, which are tufted with curly bristles, the carapace is armed with several large knob-tipped spines, namely two in the middle line on the gastric region, one in the middle line on the posterior border, one on either side near the boundary of the hepatic and branchial regions, and one, directed obliquely backwards, near the middle of either branchial region.

The rostrum consists of two vertically deflexed spines, the bases of which are broadened and fused together, and the points of which are divergent and elegantly curved.

The eyes and orbits have already been described in a general way: the long semi-tubular supra-ocular hood ends in three diverging tines, and the long post-ocular spine has its anterior border armed with two or three denticles.

The external maxillipeds have the outer edge thin and sharp, the outer edge of the ischium being emarginate, and the outer angle of the merus being produced.

The chelipeds are shorter than the other trunk-legs, and are about as long as the carapace behind the level of the post-ocular spine. In the male they are slightly stouter than the other legs, and have the palm a little swollen: in the female they are slenderer than the other legs, and have the palm slender and a little tapering.

Of the ambulatory legs, which are hairy, the first two pairs are slightly the longest, both being rather less than one-third longer than the post-rostral portion of the carapace: the last two pairs are not much shorter.

In the Museum collection are specimens from the Andaman Islands.

## STENOCIONOPS, Latr.

[*Stenocionops*, Latreille, R. A., (2) IV. 59.]

*Stenocionops*, Milne-Edwards, Hist. Nat. Crust., I. 337.

"Carapace narrow, uneven, and armed posteriorly with a large triangular prolongation which covers the base of the abdomen. The

rostrum is formed of two styliform divergent horns. The supra-ocular border is armed with a horn similar to those of the rostrum, but directed more obliquely. The eye-stalks are slender, immobile and extremely salient; their length is half the greatest breadth of the body. The first joint of the antennæ is much longer than broad, the second is slender and is inserted beneath the rostrum.

The epistome is nearly square, and the external maxillipeds have the merus extremely dilated at the antero-external angle, and excavated at the antero-internal angle. The trunk-legs, in the female, are slender and cylindrical: those of the first pair (chelipeds) are hardly stouter and are much shorter than the second, which latter are a little longer than the carapace and rostrum: the others diminish very gradually in length: all the ambulatory legs have sharp, recurved dactyli. The abdomen of the female consists of five segments, the 4th, 5th and 6th segments being fused together." (Edw.)

*Stenocionops cervicornis* (Herbst).

*Cancer cervicornis*, Herbst, Krabben, III. iii. 49, pl. lviii. fig. 2.

[*Stenocionops cervicornis*, Guérin, Icon. Regne An., Crust., pl. 8 bis, fig. 3].

*Stenocionops cervicornis*, Milne-Edwards, Hist. Nat. Crust., I. 338.

*Stenocionops cervicornis*, Cuvier, Regne Animal, Crust., pl. xxxi. fig. 1.

*Stenocionops cervicornis*, and ? *curvirostris*, A. Milne-Edwards, Ann. Soc. Ent., France, (4) V. 1865, p. 135 (pl. v. figs. 1-1e.)

*Stenocionops cervicornis*, E. Martens, Verh. zool. bot. Ges., Wien, XVI. 1866, p. 379.

[*Stenocionops cervicornis*, Cano, Boll. Soc. Nat., Napol., III. 1889, p. 177.]

*Stenocionops cervicornis*, Henderson, Trans. Linn. Soc., Zool., 1893, p. 343.

"Carapace uneven and tuberculated: rostral and supra-ocular horns slender, very long, and nearly co-equal: two large conical elevations on the sides of either hepatic region: antennæ shorter than the rostrum: chelæ finely toothed and a little incurved: legs smooth." (Edw.)

Alliance III. PERICEROIDA.

MICIPPA, Leach.

*Micippa*, Leach, Zool. Miscell., III. p. 16.

*Micippe*, Desmarest, Consid. Gen. Crust., p. 148.

*Micippe*, Milne-Edwards, Hist. Nat. Crust., I. 329.

*Micippa*, Miers, Journ. Linn. Soc., Zool., Vol. XIV. 1879, p. 661; Ann. Mag. Nat. Hist., Vol. XV. 1885, p. 3; and 'Challenger' Brachyura, p. 69.

Carapace nearly oblong, depressed, rounded behind, broadened anteriorly, and ending at a broad, lamellar, more or less vertically

deflexed rostrum, the tip of which is cleft or emarginate. The eye-stalks are long, and the corneæ, which are rather ventral than terminal in position, can be completely retracted from dorsal and usually also from ventral view. The orbit is formed by a sharply-arched supra-ocular eave, which is in contact either with an excavated post-ocular spine or with an intercalated spine as in *Maia*, and is partly or entirely completed below and in front by a process of the broad basal antennal joint. The mobile portion of the antenna is completely exposed.

The buccal frame is broadened in front: the merus of the external maxillipeds is broader than the ischium, and has its external angle expanded and its internal angle notched for the insertion of the palp.

The chelipeds in the adult male are as long as or a little longer than the carapace, are a little stouter than the other legs, and have the palm broader than the other joints, and the fingers arched to meet only at the tip. The chelipeds in the female are slenderer than the other legs, are about the same length as the carapace, and have slender palms and almost straight fingers. The ambulatory legs are moderately elongate, subcylindrical, and have the dactyli not much or not at all shorter than the propodites.

Abdomen, in both sexes, seven-jointed.

*Key to the Indian species of Micippa.*

- I. Rostrum very broad, ending in four sharp lobes or spines (i.e., each lobe of the rostrum bilobed)..... *M. philyra*.
- II. Rostrum moderately broad, ending in two long sharp lobes or spines (i.e., each lobe of the rostrum simple), not inflexed at tip..... *M. thalia*.
- III. Rostrum moderately broad, inflexed at tip; ending in two insignificant blunt lobes, each of which has a small tooth at its external angle:—
  1. Three large pearl-like tubercles embedded in the posterior margin..... *M. margaritifera*.
  2. Two small pearl-like tubercles embedded in the posterior margin, with a group of small spinules between them..... *M. margaritifera*  
var. *parca*.

*Micippa philyra*, (Herbst.) Leach.

*Cancer philyra*, Herbst, Krabben, III. iii. p. 51, pl. lviii. fig. 4.

*Micippa philyra*, Leach, Zool. Miscell., III. 16; and Desmarest, Consid. Gen. Crust., p. 149, pl. xxii. fig. 2; and Guérin, Icon. R. A., pl. viii bis, fig. 1; and Milne-Edwards, Hist. Nat. Crust., I. 330; and Adams and White, 'Samarang' Crust., p. 15; and A. Milne-Edwards, Nouv. Archiv. du Mus., VIII. 1872, p. 239, pl. xi. fig. 2 and KOSSMANN, REISE ROTH. MEER., CRUST., p. 6 (*ubi synonym.*); and varr. *platipes* and



*mascarenica*, pl. iii. figs. 2-3; and Richters, Möbius, Meeresfauna, Mauritius, p. 143, pl. xv. figs. 6-7, and var. *latifrons*, p. 142, pl. xv. figs. 1-5; and Lenz and Richters, Abh. senck. Ges. XII. 1881, p. 421; and Miers, Zoology H. M. S. 'Alert,' pp. 182 and 198, and Ann. Mag. Nat. Hist., 1885, Vol. XV. p. 6, and 'Challenger' Brachyura, p. 69; and Ortmann, Zool. Jahrb. Syst., &c., VII. 1893, p. 59; and J. R. Henderson, Trans. Linn. Soc., Zool., 1893, p. 348.

*Micippe platipes*, Rüppell, Beschreib. und Abbild., 24 Krabben Roth. Meer., Frankfurt, 1830, p. 8, tab. i. fig. 4; and Milne-Edwards, Hist. Nat. Crust., I. 333 (Paramicippe); and Heller, Crust. Roth. Meer., SB. Ak., Wien, XLIII. 1861, p. 299, tab. i. fig. 2; and De Man, Archiv. fur Naturgesch., LIII. 1887, p. 227 (Paramicippe).

*Micippe bicarinata*, Adams and White, 'Samarang' Crust., p. 16, (sec. Kossmann and Miers).

? *Micippe hirtipes*, Dana, U. S. Expl. Exp., Crust., pt. I. p. 90, pl. i. figs. 4 a-e; and Stimpson, Proc. Ac. Nat. Sci., Philad., 1857, p. 218; and Heller, Reise 'Novara,' Crust., p. 3.

*Micippa spatulifrons*, A. Milne-Edwards, Nouv. Archiv. du Mus., VIII. 1872, p. 240, pl. xi. fig. 3; and Haswell, Proc. Linn. Soc., N. S. Wales, Vol. IV. 1879, p. 445, and Cat. Austral. Crust., p. 24.

*Micippa mascarenica*, Kossm., Miers, Ann. Mag. Nat. Hist., 1885, Vol. XV. p. 7, and 'Challenger' Brachyura, p. 69; and A. O. Walker, Journ. Linn. Soc., Zool., Vol. XX. 1890, p. 109; and J. R. Henderson, Trans. Linn. Soc., Zool., 1893, p. 348.

*Micippa superciliosa*, Haswell, Proc. Linn. Soc., N. S. Wales, Vol. IV. 1879, p. 446, pl. xxvi. fig. 2, and Cat. Austral. Crust., p. 25.

*Paramicippa asperimanus*, Miers, Zoology H. M. S. 'Alert,' pp. 517 and 525.

Body and ambulatory legs closely covered by a woolly tomentum. Carapace with the regions well defined by smooth sulci, the hepatic regions sunken and pinched in, the surface closely and unevenly granular: the lateral margins are armed with knob-tipped spinules, of which there are sometimes as many as six, sometimes as few as two, on either side.

The rostrum consists of a broad lamina which in the female is quite vertically, but in males is not so much deflexed, its sides are gently sinuous, and it ends in four sharp-cut lobes. The eyes are completely retractile within the orbits.

The basal antennal joint is short and is extremely broad anteriorly, its greatly produced antero-external angle completing the orbit below and in front. The mobile portion of the antenna, which is freely exposed, varies in length and in the form of the flattened 2nd joint of the peduncle. In some males (var. *mascarenica*) the mobile portion of the antenna is half the length of the horizontal portion of the carapace, and the length of the 2nd joint is rather more than one-third the breadth of the rostrum at its own point of origin. But in all ovigerous females, and in certain males, the mobile portion of the antenna is between one-third and one-fourth the length of the hori-

zontal portion of the carapace, and the length of the 2nd joint is less than one-third the breadth of the rostrum at its own point of origin—the joint also being somewhat broadened.

The chelipeds also vary. In certain males, both adult and young (var. *mascarenica* partim), they are stouter than the other legs, are very variably granular, are a little longer than the carapace, have the hand very variably broadened and inflated, and the fingers closely apposable only at tip.

In all females they are a little shorter than the carapace, are quite smooth, are rather slenderer than the other legs, and have slender palms, and fingers that are closely apposable in the greater part of their extent. In certain other adult males they are intermediate in condition, approaching more to the female type.

The ambulatory legs are moderately stout and are hairy: the 1st pair, which are the longest, are rather longer than the chelipeds; the others decrease gradually in length.

Miers' valuable paper, *Ann. Mag. Nat. Hist.*, 1885, Vol. XV. pp. 6-8 should be consulted. After examining over forty specimens from the Andamans I adhere to Kossmann's synonymy and opinion (*loc. cit.*)

The characters upon which the separation of *M. mascarenica* from *M. phillyra* is based are all variable; and I think that we have here to deal with a case of male dimorphism, such as is known to occur in certain Beetles, where one form of male is aberrant from the female type while another form of male resembles the female in certain particulars: *vide* Bateson and Brindley, *Variation in Secondary Sexual Characters*, P.Z.S., 1892, p. 585.

### *Micippa thalia*, Herbst.

*Cancer thalia*, Herbst, *Krabben*, III. iii. 50, tab. lviii. fig. 3.

*Micippa thalia*, Gerstäcker, *Archiv. fur Naturgesch.*, XXII. 1856, p. 109; and Adams and White, 'Samarang' *Crust.*, p. 15; and A. Milne-Edwards, *Nouv. Archiv. du Mus.*, VIII. 1872, p. 238, pl. xi. fig. 1; and Kossmann, *Reise Roth. Meer.*, *Crust.*, p. 8 (*et varr.*); and Miers, *Zoology H. M. S. 'Alert'*, pp. 182 & 198, and *Ann. Mag. Nat. Hist.*, 1885, Vol. XV. p. 10 (*ubi synonym.*), and 'Challenger' *Brachyura*, p. 70; and [Cano, *Boll. Soc. Nat. Napol.*, III. 1889, p. 179]; and Ortmann, *Zool. Jahrb. Syst.*, etc., VII. 1893, p. 60; and Henderson, *Trans. Linn. Soc., Zool.*, 1893, p. 348.

*Micippa thalia* (= var. *aculeata*), de Haan, *Faun. Japon. Crust.*, p. 98, pl. xxiii. fig. 3; and Krauss, *Südafr. Crust.*, p. 51; and Bianconi, *Mem. Ac., Bologna*, III., 1851, p. 103, pl. x. fig. 2; and Kossmann, *Reise Roth. Meer.*, *Crust.*, pp. 5 and 8, pl. iii. fig. 5; and Hilgendorf, *MB. Akad., Berl.*, 1878, p. 786; and Richters, *Möbius, Meeresfauna, Maurit.*, p. 142; and Miers, *Ann. Mag. Nat. Hist.*, 1885, Vol. XV. p. 11 (*ubi synonym.*); and De Man, *Journ. Linn. Soc., Zool.*, Vol. XXII. 1888, p. 20; and Mary J. Rathbun, *Proc. U. S. Nat. Mus.*, Vol. XVI. 1893, p. 92.

*Micippe miliaris*, Gerstäcker, Archiv. fur Naturges., XXII. 1856, p. 110; and Heller, Crust. Roth. Meer., SB. Ak., Wien, XLIII. 1861, p. 298, pl. i. fig. 1; and Kossmann, Reise Roth. Meer., Crust., pp. 4 and 8; and Miers, Ann. Mag. Nat. Hist., 1885, Vol. XV., p. 11.

*Micippe haanii*, Stimpson, Proc. Ac. Nat. Sci., Philad., 1857, p. 217; and Miers, Zool. H. M. S. 'Alert,' pp. 517 and 524; and C. W. S. Aurivillius, Kongl. Sv. Vet. Ak. Handl., XXIII. 1888-89, No. 4, p. 52, pl. iv. figs. 1, 1a; and de Man, J. L. S., Zool., Vol. XXII. 1888, p. 20.

*Micippe pusilla*, Bianconi, Mem. Ac. Sci., Bologna, 1869, Vol. IX. p. 205, pl. i. fig. 1; and Hilgendorf, MB. Ak., Berl., 1878, p. 787.

*Micippe inermis*, Haswell, P. L. S., N. S. Wales, Vol. IV. 1879, p. 445, pl. xxvi. fig. 3, and Cat. Austral. Crust., p. 24.

Body and ambulatory legs covered with a woolly tomentum.

Carapace with the regions fairly well-defined, the hepatic regions depressed, and the surface closely and evenly granular. From the granular surface there usually, but not always, arise several large vertical spines, which are typically disposed as follows:—one on either supra-ocular hood, two on the gastric region in the middle line, and two placed obliquely on either branchial region. Any or all of these spines may be suppressed. The lateral margins are armed with an irregular series of spines or spinules, and a few spinules may exist on the posterior border in the middle line.

The rostrum is deflexed nearly vertically in the adult female, less vertically in the adult male, and at an angle of 45° or less in the young male: it ends in two curved divergent spines.

The basal antennal joint is produced at its antero-external angle to assist in the formation of the floor of the orbit, but there is a wide hiatus between this process and the post-ocular spine, so that the floor of the orbit is incomplete.

The chelipeds in the adult male are as long as the carapace, are not much stouter than the other legs, and have slender palms, and long slender fingers which, though nearly straight, are closely apposable only in their distal half. In the adult female the chelipeds are equal in length to the post-orbital portion of the carapace, are slenderer than the other legs, and have tapering palms and minute fingers. The merus and carpus of the ambulatory legs are sometimes swollen.

In the Museum collection are specimens, representing all the varieties of this species, from Mergui, Burma, Orissa and Malabar, as well as from Hongkong and Nagasaki.

This species shows quite as well as *M. cristata* the close relation of *Micippe* to *Maia*.

*Micippa margaritifera*, Henderson.

*Micippa margaritifera*, Henderson, Trans. Linn. Soc., Zool., 1893, p. 348, pl. xxxvi. figs. 5-7.

Carapace symmetrically sculptured, closely crisply and finely granular, and with the hepatic regions deeply excavate: there are three coarse spinules, disposed in a triangle base outwards, on either branchial region, and a denticle at the anterior boundary of the branchial region; and on the posterior margin are three smooth polished globules "exactly resembling pearls" inset.

The rostrum is long, vertically deflexed in both sexes, and incurved at the tip, which ends in two shallow lobes—the outer angle of each lobe being marked by a spinule.

The basal antennal joint has its antero-external portion greatly produced to complete the floor of the orbit.

The chelipeds in the male are a little longer than the carapace, and have the palms broadened and inflated, and the fingers closely appposable only at the tip. In the female the chelipeds are very much slenderer than the other legs, are only as long as the post-orbital portion of the carapace, and have the hand very slender and tapering. The ambulatory legs are remarkable for their large obtriangular foliaceous meropodites, which in the first pair are specially remarkable, as they are closely appposable to the front, to form, as in *Calappa*, a shield.

In the Museum collection are specimens from both sexes from the Andamans, from Ceylon (34 fms.), and from the Maldives (20-30 fms.).

*Micippa margaritifera*, var. *parca* nov. I distinguish, provisionally, as a variety, two ovigerous females from the Andamans, in which the middle "pearl" on the posterior border is replaced by a group of spinules, and in which the meropodites of the ambulatory legs are even more broadly foliaceous.

## CYPHOCARCINUS, A. M.-Edw.

*Cyphocarcinus*, A. Milne-Edwards, Nouv. Archiv. du Mus., IV. 1868, p. 73; and Miers, Journ. Linn. Soc., Zool., XIV. 1879, p. 664.

Carapace elongate, subcylindrical, with the gastric region greatly elevated; the anterior part of the gastric region, along with the front, being vertically deflexed. The rostrum is formed of two little horns, each of which is sharply bifurcate at the tip, one branch being directed forwards and outwards, the other being recurved upwards. The eyes are small and are sunk in small tubular orbits formed in the typical Periceroid manner. The antennæ are small: the basal joint has its antero external angle separated from the rest of the joint by a deep cleft. The external

maxillipeds have the merus dilated at both the internal and external anterior angles. The chelipeds in the female are not longer than the 2nd pair of legs and are hardly stouter. The ambulatory legs have the dactylus recurved, strongly spinate along the posterior edge — prehensile. The sternum in the female forms a hollow, the mouth of which is completely closed by the broad and perfectly flat abdomen.

? *Cyphocarcinus minutus*, A. M.-Edw.

*Cyphocarcinus minutus*, A. Milne-Edwards, loc. cit. pl. xix. figs. 7-12.

Carapace elongate, subcylindrical, the lateral borders nearly parallel in their posterior two-thirds, gently convergent anteriorly. Besides the greatly elevated and anteriorly deflexed gastric region, there are two or three slight bulgings on the side of either branchial region, a slight elevation on the cardiac region, and a median prolongation — overlapping the abdomen — of the posterior border. The hepatic regions are very small and are not visible from the dorsal aspect. The supra-orbital border bears one or two little teeth. The second joint of the antennal peduncle is much enlarged, the third is clavate, and the flagellum is hardly to be distinguished from the hairs on the third joint. The chelipeds in the female are smooth, but the legs are hairy and have the joints, especially the merus, somewhat broadened. Two adult females, one from the Pedro Shoal, the other from the Andamans, are in the Museum collection. The larger of the two is 10 millim. long and has the carapace deeply encrusted by a colony of calcareous Polyzoa.

#### MACROCELOMA, Miers.

*Macroceloma*, Miers, Journ. Linn. Soc., Zool., Vol. XIV. 1879, p. 665; and 'Challenger' Brachyura, p. 79.

*Entomonyx*, Miers, Zoology H. M. S. 'Alert,' p. 525.

Carapace subpyriform, but broadened anteriorly by the projecting orbits: the dorsal surface unarmed, or tuberculated, or with a few long spines: the margins without a series of elongated lateral spines, but often with a strongly developed lateral epibranchial spine, preceded by some smaller spines. The spines of the rostrum are well developed. The eyes are retractile within roomy projecting tubular orbits, which are formed much as in *Micippa*.

The antennæ have the basal joint considerably enlarged and armed distally with one or two spines. The mobile portion of the antenna is sometimes concealed by the rostrum, sometimes exposed. The merus of the external maxillipeds is broader than the ischium, and notched at the internal angle for the insertion of the palp.

The chelipeds in the male have the palms enlarged, and the fingers either arched and meeting only at the tip, or not. The ambulatory legs are rather short.

This genus might, without any unnatural stretch, be included with *Micippoides*, A. M.-Edw. (Journ. Mus. Godeffr. I., Crust., p. 254).

*Macrocoeloma nummifer*, n. sp., Plate IV. fig. 4.

Closely allied to *Macrocoeloma concava*, Miers, 'Challenger' Brachyura, p. 81, pl. x. fig. 2; and to *Entomonys spinosus*, Miers, Zoology H. M. S. 'Alert,' p. 526, pl. xlvii. fig. B.

Carapace rather more than  $\frac{1}{4}$  longer than broad, with the regions well-defined: its surface is regularly and sharply tubercular and is armed with two sharp spines—one behind the other—on the gastric region, two larger—side by side—on the cardiac region, two still larger—one obliquely behind the other—on the lateral epibranchial region, and two very small ones—one behind the other—on the intestinal region.

The rostrum consists of two straight sharp slightly diverging spines, which are about one-fifth or one-sixth the length of the carapace proper, and which in the male are slightly deflexed, but in the female are strongly deflexed.

The basal joint of the antennæ is broadly obtriangular; its antero-external angle is produced to aid in forming the floor of the orbit—this orbital process having its free margin deeply excised; its antero-internal angle carries a stout vertically directed tooth. The orbits, which are in the form of large deep projecting tubes with jagged lips, are constituted as in *Micippa*.

The chelipeds are closely and sharply granular as far as the fingers: in the male they are much stouter than the other legs, are nearly as long as the carapace and rostrum, and have large broad palms, and strongly arched fingers that meet only at the tip. In the female the chelipeds, although not much shorter than those of the male, are hardly stouter than the other legs, and have fingers that can be closely apposed throughout their extent.

The ambulatory legs are slender: in all the meropodite has its posterior margin minutely spinulose, and has a spine on the far end of the upper margin: the first pair, which are the longest, are a little longer than the chelipeds.

The rostrum carapace and legs are beset with stiff curly hairs.

The abdomen in both sexes consists of seven distinct segments.

This species commonly encrusts itself with a plate armour of Orbitolites, rounded fragments of Nullipore, &c.

Loc. Andaman Sea, 17-36 fms. Off Ceylon 34 fms.

		Male.	Adult female.
Greatest length	...	21 millim.	21 millim.
„ breadth	...	14 „	16 „
Length of chelipeds	...	19 „	15 „

### TIARINIA, Dana.

*Tiarinia*, Dana, U. S. Expl. Exp., Crust., pt. I. p. 109.

*Tiarinia*, Miers, Journ. Linn. Soc., Zool., Vol. XIV. 1879, p. 664.

Carapace subpyriform, somewhat broadened anteriorly, tuberculated, terminating in a rostrum composed of two moderately deflexed horns which are in close contact with one another, except sometimes at the extreme tip.

The eyes are enclosed in tubular orbits formed by a prominent supra-ocular roof the anterior angle of which is strongly produced forwards, by a cupped post-ocular tooth, and by a process of the broad basal antennal joint, all three elements being in the closest contact. The mobile portion of the antenna is completely exposed.

The external maxillipeds have the merus broader than the ischium owing to the expansion of its external angle, and the palp inserted in a slight notch in the internal angle of the merus.

The chelipeds are little enlarged in the male: the ambulatory legs have the dactylus short and claw-like.

The abdomen in both sexes consists of seven distinct segments.

### *Tiarinia cornigera*, (Latr., Edw.)

[*Pisa cornigera*, Latr., Encyc., X. 141.]

*Pericera cornigera*, Milne-Edwards, Hist. Nat. Crust., I. 335; and Adams and White, 'Samarang' Crust., p. 18.

*Tiarinia cornigera*, Dana, U. S. Expl. Exped., Crust., pt. I. p. 110, pl. iii. figs. 5a-e; and Stimpson, Proc. Acad. Nat. Sci., Philad., 1857, p. 217; and Haswell, Proc. Linn. Soc., N. S. Wales, Vol. IV. 1879, p. 449, and Cat. Austral. Crust., p. 28; and Miers, Ann. Mag. Nat. Hist., 1880, Vol. V. p. 228; and Mary J. Rathbun, Proc. U. S. Nat. Mus., Vol. XV. 1892, pp. 243 and 276.

? *Pericera tiarata* and *setigera*, Adams and White, 'Samarang' Crust., p. 17.

*Tiarinia verrucosa*, Heller, 'Novara' Crust., p. 4, taf. i. fig. 3.

*Tiarinia mammillata*, Haswell, Proc. Linn. Soc., N. S. Wales, Vol. IV. 1879, p. 448, and Cat. Austral. Crust., p. 27.

Body and ambulatory legs with many curly hairs.

Carapace pyriform, the regions well-defined, the surface closely and very variedly pustular nodular and granular, but with the following markings fairly constant:—two parallel longitudinal lines of small nodules between the orbits; a "cross" of larger nodules on the gastric

region, the base of the cross being formed by three pustules; three pustules arranged in a triangle base forwards on the cardiac region, behind which are three conical tubercles arranged in a transverse line; a coarse claw-like tooth at the lateral epibranchial angle.

The rostrum consists of two moderately deflexed spines, which are parallel, and in the closest contact, either throughout their extent, or to near the tips, which may then be upcurved and slightly divergent: the length of the rostrum varies from nearly one-half to one-fourth the length of the carapace, its usual length is about  $\frac{3}{4}$ ths that of the carapace.

The antennæ have the basal joint broadened and produced to form the floor of the orbit, the antero-external angle being further produced to form a coarse spine: the next two joints are broadened and fringed with stiff bristles: the flagellum is short. The eyes are ensheathed in orbits which are formed as already described: the supra-ocular eave has a dog's-ear form, and the post-ocular tooth is also salient. The chelipeds in the adult male are as long as the carapace without the rostral spines, and are a little stouter than the other legs: the merus is nodular, most markedly so on the upper surface; the carpus is granular; and the palm—which is a good deal broadened and inflated—and the fingers, are smooth and polished, the fingers being arched and meeting only at tip.

In the female and young male the chelipeds are only as long as the post-orbital portion of the carapace, are slenderer than the other legs, and have the palm slender, the fingers however being arched.

The ambulatory legs are stout, and have strong claw-like dactyli, the posterior border of which is denticulate; the ischium in all is swollen, and is more or less nodular on the upper surface; and the carpus in all is broadened: the first pair, which are considerably the longest, slightly exceed the length of the carapace and rostrum.

In the Museum collection are forty well preserved specimens from the Andamans.

The closeness of the relation between *Tiarinia* and *Micippa* is well seen in the very young of the above species, in which the carapace is depressed and is so broad in front as to be almost oblong, and the rostrum is deflexed at an angle of  $45^{\circ}$ .

## Family II. PARTHENOPIDÆ.

*Parthenopiens* (part.) and *Canceriens cryptopodes*, Milne-Edwards, Hist. Nat., Crust., I. pp. 347 and 368.

*Parthenopinea*, Dana, U. S. Expl. Exp., Crust., I. pp. 77 and 136.



*Parthenopinea*, Miers, Journ. Linn. Soc., Zool., Vol. XIV. p. 641; and 'Challenger' *Brachyura*, p. 91.

The eyes are usually retractile within small circular well-defined orbits, the floor of which is nearly continued to the front, leaving a hiatus which is usually filled by the second joint of the antennary peduncle. The basal antennal joint is small, and is deeply imbedded between the inner angle of the orbit and the antennular fossæ.

The antennules fold a little obliquely.

The *Parthenopidæ* are divided by Miers into two sub-families, namely:—

Sub-family I. *Parthenopinæ*; in which the carapace is sometimes sub-pentagonal or ovate-pentagonal, more commonly equilaterally-triangular, and sometimes almost semi-circular or semi-elliptical in outline; in which the cardiac and gastric regions are usually so deeply marked off from the branchial regions on either side as to make the dorsal surface of the carapace trilobed; in which the chelipeds are vastly longer and more massive than the ambulatory legs; and in which the rostrum is either simple or obscurely trilobed.

Sub-family II. *Eumedoninæ*; in which the carapace is, commonly, sharply pentagonal, with the junction of the antero-lateral and postero-lateral borders strongly produced; in which the cardiac and gastric regions are not conspicuously marked off from the branchial regions; and in which the chelipeds are of moderate size.

#### Sub-family I. PARTHENOPINÆ, Miers.

Miers, Journ. Linn. Soc., Zool., Vol. XIV. 1879, p. 668.

##### Key to the Indian genera.

##### I. Carapace not laterally expanded:—

1. Basal antennal joint very short, not nearly reaching the inner canthus of the orbit: fingers of chelipeds very strongly incurved... LAMBEUS.
2. Basal antennal joint nearly reaching the inner canthus of the orbit: fingers slightly incurved ..... PARTHENOPE.

##### II. Carapace more or less expanded to form a vault in which the ambulatory legs are concealed:—

1. Carapace transversely triangular; greatly expanded both laterally and posteriorly ..... CRYPTOPODIA.
2. Carapace transversely triangular; expanded laterally, but not posteriorly: a ridge on the pterygostomial region..... HETEROCRYPTA.

3. Carapace transversely oval; expanded laterally,  
but not posteriorly: no ridge on the ptery-  
gostomial region..... CETHRA.

### LAMBRUS, Leach.

*Lambrus*, Leach, Trans. Linn. Soc., Vol. XI. 1815, pp. 308, 310.

*Lambrus*, Milne-Edwards, Hist. Nat. Crust., I. 352.

*Lambrus*, A. Milne-Edwards, Miss. Sci. Mex., Crust., I. p. 146.

*Lambrus*, Miers, J. L. S., Zool., Vol. XIV. 1879, p. 668; and 'Challenger' Brachy-  
ura, p. 91.

Carapace either broadly triangular with rounded sides and pointed front, or ovate-pentagonal with front pointed but extremely short: the surface is granular, or tubercular, or spiny.

The eyes are enclosed in distinct orbits, which have a suture above and a hiatus below, the hiatus being occupied by the second joint (true third joint) of the antennal peduncle.

The antennules fold obliquely. The antennæ are small: their basal joint, which is extremely short, and does not reach the front, is wedged in between the antennular fossa and the large lobe that constitutes the floor of the orbit.

The buccal frame is usually quadrangular, but is sometimes a little narrowed in front; it is completely closed by the external maxillipeds: the epistome is sometimes very large, sometimes narrow.

The chelipeds are usually of immense size and length, out of all proportion to the short slender ambulatory legs: the meropodite and "hand" are usually prismatic, with the borders strongly dentate: the fingers are much shorter than the palm, and are abruptly curved inwards and a little downwards.

The abdomen of the female usually consists of seven segments; that of the male of five or six.

Professor A. Milne-Edwards, (Miss. Sci. Mex., Crust., I. pp. 146-148) subdivides the genus *Lambrus* into ten sub-genera, the independence of all of which, however, is not universally admitted.

The sub-genera at present known to exist in Indian waters are shown in the following

#### Key to the Indian sub-genera of the genus *Lambrus*.

- I. Carapace tuberculate, ovate-pentagonal, the rostrum not  
breaking beyond the general outline of the body: the  
buccal frame a little narrowed in front..... LAMBRUS.

- II. Carapace strongly carinated or tuberculated, broadly triangular (considerably broader than long), with rounded sides and a broad but sharp-pointed projecting rostrum: no post-ocular constriction: chelipeds with the arm and hand straight, sharply trigonal, the edges of these joints, as also the outer edge of the carpus, being very sharply and stoutly serrated..... PLATYLAMBRUS.
- III. Carapace granular or spiny, usually as long as broad, with a projecting rostrum, and a very distinct post-ocular constriction..... RHINOLAMBRUS.
- IV. Carapace granular, broader than long, and with the postero-lateral angle produced to form a great blade-like spine. Pterygostomian region deeply channelled, obliquely, the channel being closed below by thick fringes of hairs .... AULACOLAMBRUS.
- V. Carapace worn and eroded, broader than long, almost semi-circular in outline, with the postero-lateral angle produced; the rostrum more or less deflexed, and not, or hardly, breaking the general outline: no post-ocular, but a fairly distinct post-hepatic constriction: chelipeds with the arm and hand indefinitely contorted, not sharply trigonal; and with their edges, if spinate, irregularly and bluntly so; the carpus quite smooth externally: the chelipeds are short for the genus..... PARTHENOLAMBRUS.

### Sub-genus LAMBRUS, A. Milne-Edwards.

*Lambrus*, A. Milne-Edwards, Miss. Sci. Mex. Crust., I. p. 146.

*Lambrus*, Miers, 'Challenger' Brachyura, p. 92, (part.)

Carapace ovate-pentagonal, with the surface granular or pustular and but little carinate in the adult: rostrum exceedingly short.

### *Lambrus longimanus*, Leach.

? *Cancer spinosus longimanus*, Rumph, Amboin. Rariteitk., pl. viii. fig. 2.

*Cancer macrochelos*, Seba, III. xix. 1, 8, 9.

? *Parthenope longimanus*, Fabr. Suppl., p. 353.

? *Cancer longimanus*, Linn., Syst. Nat., II. 1046, 42.

? *Cancer longimanus*, Herbst, Krabben, I. ii. 253, taf. xix. figs. 105, 107.

*Lambrus longimanus*, Leach, Trans. Linn. Soc., Vol. XI. 1815, p. 310; and Milne-Edwards, Hist. Nat. Crust., I. 354; and Cuvier, Regne Animal, pl. xxvi. fig. 1; (and ? *Lambrus longimanus*, Adams and White, 'Samarang' Crust., p. 30); and Bleeker, Crust. de l'Ind. Archip., p. 17 (*nec syn. pelagicus*, Rupp.); and Miers, Ann. Mag. Nat. Hist., 1879, Vol. IV. p. 20, and Zoology H. M. S. 'Alert,' pp. 182 and 200, and 'Challenger' Brachyura, p. 95; and W. A. Haswell, P. L. S., N. S. Wales, Vol. IV. 1879, p. 449, and Cat. Austral. Crust., p. 31; and A. O. Walker, J. L. S., Zool., Vol. XX. 1890, p. 109; and de Man, J. L. S., Zool., Vol. XXII. 1888, p. 21 (*ubi synonym.*); and Henderson, Tr. Linn. Soc., Zool., (2) V. 1893, p. 349.

Carapace almost oval transversely, and with the surface granular or pustular. (In the young, besides tubercles, there are some coarse spinules in five series—a median, and two oblique lateral on either side.) The lateral borders are spinulate or crenulate anteriorly, spinate posteriorly, smooth quite posteriorly at the junction with the posterior border: the posterior border, except for a hook-like spinule at either end, and two spinules in the middle line, is smooth: there are often one or two curved spines on the branchial region: the pterygostomian region is quite smooth, but on the inferior branchial region are a few coarse spinules, most distinct at the bases of the legs.

The rostrum, which is symmetrically trilobed, is very small, its length being less than one-twelfth that of the rest of the carapace.

The chelipeds, which are massive, are about four times the length of the carapace in the male, about  $3\frac{1}{2}$  times in the female: the *meropodite* is prismatic, or, in transverse section, rhomboidal; its anterior and posterior edges are armed with numerous, somewhat curved, spines—alternating larger and smaller; its upper edge, as sometimes either upper surface, has a row of spinules; its lower edge is rounded, and has a discontinuous series of spinules; its under surfaces are smooth and polished: the *carpus* has 3 or 4 sharp thin teeth on its outer margin: the trigonal *palm* has twelve or more sharp thin lacinated teeth on its outer edge—alternately larger and smaller; along its inner edge is a long series of multicuspid spines; its under edge is finely beaded, and its under surfaces are almost smooth; its upper surface has numerous irregularly disposed spinules and granules: the *dactylus* has numerous spinules on the outer surface of its broad base.

The ambulatory legs have the merus compressed and spinulate as to its edges, especially the posterior (inferior) edge: the longest of the ambulatory legs is hardly longer than the meropodite of the chelipeds.

Colours in life, pale lilac dorsally, white ventrally.

In the Museum collection are numerous specimens from the Madras coast, from Arrakan and Mergui, and from the Andamans.

#### Sub-genus PLATYLAMBRUS, Stimpson.

*Platylambrus* and *Enoplolambrus*, A. Milne-Edwards, Miss. Sci. Mex., Crust., I. pp. 146 and 147.

*Lambrus*, Miers, 'Challenger' Brachyura, p. 92 (part).

Carapace carinated or tuberculated, broader than long, broadly triangular with rounded sides and a broad but acute and projecting rostrum: no post-ocular constriction: chelipeds with the meropodite dan palm straight, the former joint prismatic, the latter sharply tri-

gonal, the anterior and posterior borders of both joints sharply laciniate or serrate, as is also the outer edge of the carpus.

*Key to the Indian species of the sub-genus* *Platylambrus*.

- |   |   |   |                                  |
|---|---|---|----------------------------------|
| <p>I. Carapace with three distinct carinae, one median, and one, oblique, on either side: chelipeds with their surfaces (but not their edges) for the most part smooth: ambulatory legs, with few spines.</p> | } | <p>1. Infra-orbital lobe entire and strongly produced at the inner (inferior) angle to form a great spin plainly visible from above on either side of the rostrum . . . . .</p> | <p><i>L. prensor</i>.</p>        |
|   |   | <p>2. Infra-orbital lobe deeply cleft, the inner portion not or hardly visible from above</p>   | <p><i>L. carinatus</i>, Edw.</p> |
- II. Carapace covered with great mushroom-like or paxilliform tubercles: chelipeds with their surfaces very strongly spinate or tuberculate: ambulatory legs strongly spiniferous . . . . .
- L. echinatus*.

*Lambrus* (*Platylambrus*) *prensor*, Herbst.

*Lambrus prensor*, Herbst, Krabben, II. ii. 170, tab. xli. fig. 3.

*Lambrus prensor*, Milne-Edwards, Hist. Nat. Crust., I. 358.

*Lambrus jourdainii*, F. de B. Capello, Journ. Sci. Lisbon, III. 1870-71, tab. 3, fig. 6.

*Lambrus prensor*, A. Milne-Edwards, Nouv. Archiv. du Mus., Vol. VIII. 1872, p. 260 (foot-note); and Miss. Sci. Mex., Crust., I. p. 147 (foot-note).

*Lambrus prensor*, Walker, J. L. S. Zool., Vol. XX. 1890, p. 109 (name only).

Our numerous specimens correspond exactly with Capello's figure and succinct and graphic description. M. A. Milne-Edwards at first assigned Capello's species to *L. carinatus*, Edw., but afterwards to *L. prensor*, and it is this last authority that I now follow.

Carapace broader than long, broadly triangular with the sides rounded: the median and branchial regions are strongly prominent, the former having three small spinules in the middle line, the latter having each two oblique granular ridges, one of which is very faint and runs to the large lateral epibranchial spine, the other of which forms a strong carina, and runs to the large spine at the postero-lateral angle. The antero-lateral margin is armed with 7 or 8 nearly equal-sized close-set compressed teeth, behind which, at the lateral epibranchial angle, is a very large blade-like spine: behind this again, on the postero-lateral border are two large teeth, the outer of which, at the postero-lateral angle, is nearly as large as the lateral epibranchial spine; and lastly on the posterior border are three large curved spines.

The rostrum is acute, concave at base, and slightly recurved at tip: on either side of the rostrum is seen from above a very strong and acute spine formed by the prolongation of the inner margin of the infra-orbital lobe—this lobe is entire.

The chelipeds are massive and are about three times the greatest length of the carapace: their surfaces are almost smooth: the arm is rhomboidal in transverse section, and the palm is sharply trigonal: the lower edges of the arm, wrist and palm form a continuous line of beading: the upper edge of the arm is granular and spinular: the inner or anterior edges of the arm, wrist and hand are spinate—the spines growing larger towards the end of the palm, while the posterior (or outer) edges of the same three joints are very strongly and closely lacinate.

As usual the spines in all cases have a tendency to be alternately larger and smaller.

Of the ambulatory legs the merus, carpus and propodus have the anterior (upper) border strongly and sharply carinate, while the merus has also the posterior border spinate.

This species is not uncommon along the Orissa coast, from 8 to 23 fathoms.

*Lambrus (Platylambrus) carinatus*, Edw.

*Lambrus carinatus*, Milne-Edwards, Hist. Nat. Crust., I. 358.

*Lambrus carinatus*, A. Milne-Edwards, Miss. Sci. Mex., Crust., I. p. 147 (foot-note).

Our specimens, which agree with the diagnoses of M. A. Milne-Edwards completely, are distinguished from those above described as *L. prensor*, (1) by having the mid-dorsal carina formed by three great compressed teeth; (2) by the single, and very high and sharply cut carina on either branchial region; (3) by the smaller size of the spine at the lateral epibranchial angle and of the spine, at the postero-lateral angle, immediately succeeding it; (4) by the form of the infra-orbital lobe, which instead of being entire, is bilobed—the inner lobe, moreover, having a rounded apex, and not being visible from above; (5) by the meropodites of the ambulatory legs having their anterior (upper) edge serrate, not carinate, and by the carpopodites and propodites having the anterior edge smooth.

These differences are constant in a series of twelve specimens, including both sexes.

This species also differs from *L. prensor* in its much smaller size, three ovigerous females having the carapace 11 millim. in its greatest breadth (exclusive of spines), while ovigerous females of *L. prensor* have the carapace 28 to 30 millim. in its greatest breadth exclusive of spines.

[ ? *Lambrus* (*Platylambrus*) *holdsworthii*, Miers.

*Lambrus holdsworthii*, Miers, Ann. Mag. Nat. Hist., Vol. IV. 1879, p. 19, pl. v. fig. 3; and 'Challenger' Brachyura, p. 93 and Henderson, Trans. Linn. Soc., (2) V. 1893, p. 350.

The single specimen that I doubtfully refer, from Miers' figure and description, to this species, has a close resemblance to both the species identified above as *L. prensor* and *L. carinatus*. It differs from them both (1) in having numerous scattered tubercles on the carapace, and (2) in having the large spine at the lateral epibranchial angle and the two outer spines on the postero-lateral margin all of about the same size. It resembles *L. prensor*, and differs from *L. carinatus*, in not having the branchial region traversed by a single sharp-cut carina: and it resembles *L. carinatus*, and differs from *L. prensor*, in having a median line (though not a high carina) of three large teeth, in having the infra-orbital lobe deeply cleft and not exceedingly produced, and in having the anterior (or upper) edge of the meropodites of the ambulatory legs dentate instead of carinate.]

*Lambrus* (*Platylambrus*) *echinatus*, Herbst.

*Cancer echinatus*, Herbst, Krabben, I. ii. 255, taf. xix. figs. 108-109.

*Parthenope giraffa*, Fabr., Supplement, p. 353.

[*Maia echinatus* and *giraffa*, Bosc, I. 250].

*Lambrus giraffa*, Desmarest, Consid. Crust., p. 85.

*Lambrus echinatus*, Milne-Edwards, Hist. Nat. Crust., I. 356.

*Lambrus echinatus*, Miers, 'Challenger' Brachyura, p. 93.

Carapace broader than long, broadly triangular with the sides rounded: the gastric and cardiac regions are elevated, and are delimited on either side from the elevated branchial regions by broad and deep grooves. The entire carapace is covered, but not very densely, with large mushroom-like and paxilliform tubercles, the spaces between which are occupied, but not densely, by short, crisp, upstanding hairs. The lateral margins are armed with ramose spines, which increase in size from before backwards: the posterior and part of the postero-lateral margins are armed with tubercles like those on the surface of the carapace. The granular rostrum is broad and concave at the base, and is then suddenly narrowed to form a little peak.

The chelipeds which are from  $3\frac{1}{2}$  (female) to  $3\frac{3}{4}$  (male) the greatest length of the carapace, are distinguished by having their upper aspect (edges and surfaces) covered with ramose spines, and their under aspect covered with great pearly tubercles. The ambulatory legs are distin-

guished by the large and numerous spines on their 3rd, 4th and 5th joints.

This species is not uncommon off the Orissa coast from 7 to 23 fathoms.

Sub-genus RHINOLAMBRUS, A. Milne-Edwards.

*Rhinolambrus*, A. Milne-Edwards, Miss. Sci. Mex., Crust., I. p. 148.

*Lambrus*, Miers, 'Challenger' Brachyura, p. 92 (part.).

Carapace triangular, usually as long as broad, with a broad projecting somewhat declivous rostrum and a very distinct post-ocular constriction; surface of carapace very commonly, but not always, spiny and granular.

*Key to the Indian species of the sub-genus Rhinolambrus.*

- |   |   |  |   |  |                         |
|---|---|--|---|--|-------------------------|
| I. Chelipeds stout, three times to twice or less the length of the carapace and rostrum.      | { | 1. Carapace and chelipeds very closely covered with large rugged granules and sharp ramosc spines.         | { | i. Chelipeds nearly three times the length of the carapace and rostrum.....  | <i>L. contrarius.</i>   |
|   |   |  |   | ii. Chelipeds not two-and-a-half times the length of the carapace and rostrum.....   | <i>L. longispinis.</i>  |
|   | { | 2. Carapace with few depressed tubercles, or nearly smooth; chelipeds with blunt teeth or smooth granules. | { | i. Chelipeds three times the length of the carapace and rostrum.....   | <i>L. pelagicus.</i>    |
|   |   |  |   | ii. Chelipeds not twice the length of the carapace and rostrum .....   | <i>L. gracilis.</i>     |
| II. Chelipeds slender, three-and-a-half to five times the length of the carapace and rostrum. | { | 1. Carapace at least as long as broad: large erect turret-like spines on the carapace.                     | { | i. A single turret on the cardiac region, and on either branchial region: two large diverging spines in the middle line on the posterior border... | <i>L. turritiger.</i>   |
|   |   |  |   | ii. Two turrets on the cardiac region, and two on either branchial region: a single spinule on the posterior margin.....                           | <i>L. cybelis.</i>      |
|   | { | 2. Carapace broader than long; large spines of ordinary form on the carapace                               |   |  | <i>L. petalophorus.</i> |
|   |   |  |   |  |                         |



*Lambrus (Rhinolambrus) contrarius*, Herbst.

*Cancer contrarius*, Herbst, Krabben, III. iv. 18, tab. lx. fig. 3.

[*Parthenope spinimana*, Lamk., Hist. Anim. Sans. Vert., V. 239.]

*Lambrus spinimanus*, Desmarest, Consid. Crust., p. 86, pl. iii. fig. 1.

*Lambrus contrarius*, Milne-Edwards, Hist. Nat. Crust., I. 354.

*Lambrus contrarius*, Bleeker, Recherches Crust. de l'Ind. Archip., p. 18.

*Lambrus contrarius*, A. Milne-Edwards, Maillard's l'île Réunion, Annexe F, p. 10.

*Lambrus contrarius*, Brocchi, Ann. Sci. Nat., (6) II. 1875, Art. 2, p. 98, pl. xviii. figs. 166, 167 (♂ appendages).

*Lambrus contrarius*, Richters, in Möbius, Meeresf. Maurit., p. 145.

*Lambrus contrarius*, Miers, Ann. Mag. Nat. Hist., 1880, Vol. V. p. 230; and 'Challenger' Brachyura, p. 94.

*Lambrus contrarius*, J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 350.

Carapace, with rostrum, slightly longer than broad, everywhere covered with jagged granules and spines: the regions are strongly convex, and, usually, in the middle line, are three or four, and again on either branchial region, one or two spines of predominant size. The rostrum is broad, prominent, declivous, and spiny or granular, both on the upper surface and along the margins. The hepatic regions are very prominent, and their angle is strongly produced. The orbital edge is prominent and the post-orbital constriction strongly pronounced.

The chelipeds are about three times the length of the carapace and rostrum, and are extremely massive, the hands especially: above they are covered with large sharp jagged spines with rough tubercles interspersed; below they are everywhere covered with rasp-like granules. The ambulatory legs are rather stout for a *Lambrus*, and have the merus somewhat spiny along one or both edges.

Colours in spirit, mottled pink, tips of fingers purple-black, ambulatory legs banded alternately yellow and bluish pink.

Our largest specimens, a male and a female, are from off Colombo, 26½ fathoms, and have a span (of chelipeds) of 290 millim. and 265 millim. respectively.

*Lambrus (Rhinolambrus) longispinus*, Miers.

*Lambrus longispinus*, Miers, Ann. Mag. Nat. Hist., 1879, Vol. IV. p. 18; Zoology H. M. S. 'Alert,' pp. 182 and 199; and 'Challenger' Brachyura, p. 93.

*Lambrus longispinus*, de Man, Archiv. für Naturgesch., LIII. 1887, p. 229.

*Lambrus longispinus*, Walker, Journ. Linn. Soc., Zool., Vol. XX. 1890, p. 109.

*Lambrus longispinus*, Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 350.

*Lambrus spinifer*, Haswell, P. L. S., N. S. Wales, Vol. IV. 1879, p. 451, pl. xxvii. fig. 1; and Cat. Aust. Crust., p. 34.

Carapace, with rostrum, little longer than broad, its surface covered with spiny tubercles: There are four prominent spines in the middle

line, of which three are on the cardiac and one is on the gastric region ; in front of the latter are two smaller spines placed transversely : on the branchial regions are some small spines set in two oblique series, and one large spine. On the antero-lateral margins are about nine small close-set blunt faintly-laciniated teeth, slightly increasing in size posteriorly ; on the postero-lateral margin are two large spines ; and on the posterior border, in the middle line, is a pair of spines. The rostrum is broad, prominent, acute and declivous. The post-ocular constriction is distinct ; and the hepatic regions are well marked, with the outer border denticulate. The chelipeds in the male are about  $2\frac{1}{2}$  times the length of the carapace and rostrum : they much resemble those of *L. contrarius*, the spines being for the most part jagged, and the tubercles rasp-like. On the anterior (inner) margin of the arm are 10 or 12 spines alternating in size, the last three being very small ; on the upper surface of the arm three spines are very prominent, as are three or four on the posterior (outer) edge. On the anterior (inner) margin of the hand are 7 or 8 spines increasing in size from behind forwards ; while on the posterior margin are numerous spines — only three or four of which are large. The lower surface of the arms, wrists and hands is closely covered with large round rasp-like tubercles. The merus and sometimes the two following joints of the ambulatory legs, have the margins dentate.

Our single specimen from the Arrakan coast, 13 fms., is plainly the same as Haswell's *L. spinifer*, judging from his figure (*tom. cit.*) Both from that figure and from our specimen I should consider the species to be more nearly related to *L. contrarius* than to *L. validus*.

*Lambrus (Rhinolanthus) pelagicus*, Rüpp.

*Lambrus pelagicus*, Rüppell, Beschr. u. Abbild. 24 Art. Krabben des Roth. Meer., p. 15, pl. iv. fig. 1

*Lambrus pelagicus*, Milne-Edwards, Hist. Nat. Crust., I. 355.

*Lambrus pelagicus*, Rüpp. (prob. = *affinis*, A. M.-Edw.) Miers, Ann. Mag. Nat. Hist., 1879, Vol. IV. p. 21.

*Lambrus pelagicus*, Ortmann, Zool. Forsch. in Austral. u. Malay. Archip., Jena, 1894, p. 46.

*Lambrus affinis*, A. M.-Edw., Nouv. Archiv. du Mus., VIII. 1872, p. 261, pl. xiv. fig. 4.

*Lambrus affinis*, Haswell, Cat. Austral. Crust., p. 34.

*Lambrus affinis*, Miers, 'Challenger' Brachyura, p. 95.

*Lambrus affinis*, J. R. Henderson, Trans. Linn. Soc., Zool. (2) V. 1893, p. 350.

[*Lambrus affinis*, F. Muller, Verh. Ges. Basel, VIII. p. 473.]

[*Lambrus affinis*, Cano, Boll. Soc. Nat. Napol., III. 1889, p. 187.]

Carapace, with rostrum, as long as broad : its regions well delimited and faintly pitted and pimpled, the furrows between the regions

being smooth and bare—except for a pimple at each of the four angles of the cardiac region. On either branchial region, above the postero-lateral angle of the carapace, is a bluntly conical spine. The rostrum is very broad, and is concave and bluntly pointed: on either side above the eye is a little eminence which carries a tuft of long silky hairs. The post-ocular constriction is distinct, as is also the post-hepatic. The antero-lateral (including the hepatic) margin is faintly crenulated: the posterior border is quite smooth.

The chelipeds in the male are three times the length of the carapace, but not more than  $2\frac{1}{2}$  times in the female: the anterior (or inner) margin of the arm and hand is evenly and bluntly dentate, or crenulate; the posterior (or outer) margin in the same joints is as evenly but much more bluntly and indistinctly dentate, and the lower margin faintly beaded: the carpus is either quite smooth or has a few nodules.

The ambulatory legs are smooth, rather stout, and are longer than the hand. In the male near the anterior border of the 6th abdominal tergum is a strong spine. This is a fairly common species at the Andamans.

*Lambrus (Rhinolambrus) gracilis*, Dana.

*Lambrus gracilis*, Dana U. S. Expl. Exp. Crust., pt. I. p. 137, pl. vi. figs. 6 a-b.

*Lambrus gracilis*, Miers, 'Challenger' Brachyura, p. 94.

*Lambrus deflexifrons*, Alcock and Anderson (*nec* Miers), J. A. S. B., 1894, pt. ii. p. 199.

Carapace, with rostrum, considerably longer than broad; with a pronounced post-ocular constriction; somewhat rhomboidal in shape: the regions are extremely prominent, especially the cardiac, which is capped by a conical tooth, and the branchial, which rises into an oblique crest terminating posteriorly in a tooth: the hepatic region forms a prominent tooth, behind which the rounded lateral margins are 6 or 7 toothed: there are two laminar teeth on the posterior border: otherwise the carapace is smooth. The rostrum is broad, deflexed, and distinctly trilobed towards the tip.

The chelipeds are not quite twice the length of the carapace and rostrum; and in the adult are not symmetrical—one, either right or left, having the hand much larger than the other. In the young the asymmetry is hardly noticeable. The arm has the anterior (inner) and posterior (outer) border irregularly armed with compressed blunt spines, of which the one at the far end of the outer border is the largest—being almost foliaceous: the hand has its inner and outer borders armed in the same irregular way, two or three of the teeth on the outer border, and one on the inner border being enlarged: the under surfaces

of the chelipeds are quite smooth, but the upper surface of the arm has an incomplete longitudinal line of beading. The ambulatory legs are long and particularly slender.

In the Museum collection are specimens of males, ovigerous females and young, from the Andamans and from off Ceylon.

*Lambrus (Rhinolambrus) deflexifrons*, Miers.

*Lambrus deflexifrons*, Miers, Ann. Mag. Nat. Hist., Vol. IV. 1879, p. 21, pl. v. fig. 5. Ceylon.

This species, which is not represented in the Museum collection, is described as follows by Miers:—

“The carapace is strongly constricted behind the orbits, with the cardiac region very convex, and with an oblique but shallow sulcus on the branchial regions, and is covered with closely-set small tubercles; the antero-lateral margins are unarmed; but there are two larger tubercles or small spines on the postero-lateral margins. The rostrum is vertically deflexed, triangular, and granulated above. The basal antennal joint is very small; the epistoma is large; the sub-hepatic and pterygostomian regions are not channelled. The anterior legs have the arm rounded and tuberculate above, with small spines on its anterior margin; the wrist is tuberculate; the hand with a few tubercles on its upper surface, the anterior margin armed with about ten, and the posterior with four granulated spines. The under surface of arm, wrist, and hand is closely granulated. The ambulatory legs are smooth, and are not compressed and cristate as usual in the genus.

The vertically deflexed rostrum and carapace, devoid of spines on its surface and anterior margins, and non-compressed ambulatory legs are characteristic of this species. It seems to be allied to *L. gracilis*, Dana, a species from the Fijis, in the form of the carapace and legs; but in that species the carapace has a spine on the cardiac and each branchial region, and elsewhere appears to be smooth.”

*Lambrus (Rhinolambrus) turriger*, Ad. & Wh.

*Lambrus turriger*, White, P. Z. S., 1847, p. 58; Ann. Mag. Nat. Hist., Vol. XX. 1847, p. 63; and Adams and White, ‘Samarang’ Crust., p. 26, pl. v., fig. 2.

*Lambrus turriger*, W. A. Haswell, Proc. Linn. Soc., N. S. Wales, Vol. IV. 1879, p. 449; and Cat. Austral. Crust., p. 32.

LAMBRUS TURRIGER, MIERS, ZOOLOGY H. M. S. ‘ALERT,’ p. 201; and ‘Challenger’ Brachyura, p. 96.

Carapace, with rostrum, a little broader than long; slightly granular; the regions well-defined and armed with huge, erect or semi-erect, knob-headed spines, as follows:—one on the gastric region, in the mid-

dle line, one on the cardiac region in the middle line, and one on each branchial region: there is sometimes a little spinule in front of the gastric spine, and one in front of either branchial spine; and on the posterior border, in the middle line, are two divergent spines directed backwards. The rostrum is broad, concave between the eyes, somewhat deflexed, and may be described as trilobed near the tip—since it is there suddenly truncated and continued in the middle line only.

There is a distinct post-ocular constriction, and the hepatic regions are well-defined laterally.

The chelipeds are long slender and rugose: the arm is cylindrical, and the palm subcylindrical, becoming enlarged and trigonal near the fingers: in the male the chelipeds are from  $4\frac{1}{2}$  to  $5\frac{1}{2}$  times the length of the carapace and rostrum, in the female they are but  $3\frac{1}{3}$  to  $3\frac{1}{2}$  times this length.

The ambulatory legs are long, very slender, and perfectly smooth.

In the Museum collection are numerous specimens from the Andamans, from the Madras coast, and from off Ceylon at 32 to 34 fathoms.

There are undoubtedly two sorts of males: one sort resembling the female in having the chelipeds comparatively short, the other sort having very long chelipeds.

*Lambrus (Rhinolambrus) cybelis*, n. sp.

This species closely resembles *L. turriger*, from which it differs only in the following characters:—

- (1) the regions of the carapace are all more elevated, and on the cardiac region—one behind the other, in the middle line—as well as on either branchial region, are *two* very large semi-erect spines of equal size; while in the middle of the granular posterior border is a single spinule:
- (2) the surface of the carapace, besides being granular, is very evenly and regularly pitted or reticulated:
- (3) the rostrum, which is nearly one-third the greatest breadth of the carapace, is more distinctly trilobed:
- (4) the chelipeds (which in females and young males are only  $3\frac{1}{4}$  to  $3\frac{1}{2}$  times the length of the carapace and rostrum), though of the same general slender proportions as in *L. turriger*, have the hand distinctly trigonal throughout, and the arm and hand armed with sharp lacinated spines on the upper aspect.

A young male from off Ceylon, 34 fms., and two probably half-grown males, and an ovigerous female, from off the Andamans, 41 to 86 fathoms.

The characters that distinguish this species are constant throughout the series, without any modification or variation.

Greatest length of carapace in ovigerous female	...	15 millim.
Do. breadth do. do. do.	...	15 millim.
Length of chelipeds in ovigerous female	...	52 millim.

*Lambrus (Rhinolambrus) petalophorus*, n. sp.

Carapace of the same general shape as in *L. turriger*, but broader posteriorly, where its breadth exceeds its length with the rostrum. The hepatic region is extremely well demarcated, not by its prominence, but by its almost vertical outer wall.

The cristiform antero-lateral border, which runs from the angle of the buccal frame outside the limit of the hepatic region, is festooned by 7 or 8 close-set thin teeth, and there is a strong upcurved spine at the postero-lateral angle.

The postero-lateral border carries three teeth, the innermost of which is hardly less prominent than that at the postero-lateral angle: the posterior border is finely denticulated.

The rostrum, the breadth of which is about  $\frac{2}{3}$  the greatest breadth of the carapace, is elegantly trilobed.

The regions of the carapace are strongly elevated, and have the surface pitted or reticulated: in the middle line on the gastric region is a single erect conical spine, on the cardiac region two; and on either branchial region there is a spine. In front of the gastric spine are two spinelets, disposed transversely.

The supra-orbital margin is strongly arched, and the infra-orbital lobe is cut into two elegantly crimped leaflets or petals.

The post-ocular constriction is distinct.

The chelipeds in the male are four and-a-half times the length of the carapace and rostrum: the *arm* is slender and subcylindrical, with a line of many spinules along both the inner and outer borders, a broken line of sharp tubercles along its upper surface, and a line of granules along its lower border, but is otherwise smooth and polished: the *carpus* has a few coarse spinules on its outer surface: the *hand*, though distinctly trigonal, is long and slender, but is enlarged at the far end; its inner and outer borders are irregularly and unequally lacinated, the teeth becoming larger and closer set towards the far end; except for a line of beading along its lower border and an occasional spinule on its upper surface, its surfaces are smooth and polished: the movable *finger* has its broad base denticulated.

The ambulatory legs are very slender and very short—only one-

fifth longer than the carapace : except for a line of spinules along the posterior (lower) border of the meropodite they are smooth.

Greatest length of carapace (male) ... 16 millim.

„ breadth „ ... 18 „

Length of cheliped ... 72 „

Off Ceylon in deep-water.

Colours in spirit : chelipeds and legs purplish white, carapace dull slaty purple.

#### Sub-genus AULACOLAMBRUS, A. M.-Edw.

*Aulacolambrus*, A. Milne-Edwards, Miss. Sci. Mex. Crust., I. p. 147.

*Aulacolambrus*, Miers, 'Challenger' Brachyura, p. 97.

Pterygostomian region traversed, from the orbit to the afferent branchial orifice, by a deep channel, which is closed and converted into a tube by thick fringes of hairs : the lateral epibranchial spine is of huge size : the edges of the carapace chelipeds and legs are more or less conspicuously hairy.

#### Key to the Indian species of the sub-genus *Aulacolambrus*.

- |   |  |   |                         |   |   |   |                        |  |                    |
|---|--|---|-------------------------|---|---|---|------------------------|--|--------------------|
| I. Carapace as long as broad, with a projecting rostrum and a distinct post-ocular constriction; its surface closely covered with rasp-like tubercles: carapace and legs not conspicuously hairy.....                   | <i>L. sculptus</i> .   |   |                         |   |   |   |                        |  |                    |
| II. Carapace broader than long, its surface irregularly tuberculate; rostrum not or hardly projecting: no post-ocular constriction: margins of carapace, chelipeds and legs fringed with remarkably long tangled hairs. | <table border="0"> <tr> <td>1. Antero-lateral border with large spines in front of the large lateral epibranchial spines: spines of inner edge of hand strongly curved upwards and outwards..</td> <td><i>L. curvispinis</i>.</td> </tr> <tr> <td>2. Antero-lateral border with small teeth in front of the large lateral epibranchial spines: spines of inner edge of hand not curved.</td> <td> <table border="0"> <tr> <td>a. No spines in middle line of carapace, or on branchial regions.....</td> <td><i>L. hoplonotus</i>.</td> </tr> <tr> <td>b. Some spines in middle line of carapace, and on branchial regions: spines on outer edge of hand very long.....</td> <td><i>L. whitei</i>.</td> </tr> </table> </td> </tr> </table> | 1. Antero-lateral border with large spines in front of the large lateral epibranchial spines: spines of inner edge of hand strongly curved upwards and outwards.. | <i>L. curvispinis</i> . | 2. Antero-lateral border with small teeth in front of the large lateral epibranchial spines: spines of inner edge of hand not curved. | <table border="0"> <tr> <td>a. No spines in middle line of carapace, or on branchial regions.....</td> <td><i>L. hoplonotus</i>.</td> </tr> <tr> <td>b. Some spines in middle line of carapace, and on branchial regions: spines on outer edge of hand very long.....</td> <td><i>L. whitei</i>.</td> </tr> </table> | a. No spines in middle line of carapace, or on branchial regions..... | <i>L. hoplonotus</i> . | b. Some spines in middle line of carapace, and on branchial regions: spines on outer edge of hand very long..... | <i>L. whitei</i> . |
| 1. Antero-lateral border with large spines in front of the large lateral epibranchial spines: spines of inner edge of hand strongly curved upwards and outwards..   | <i>L. curvispinis</i> .  |   |                         |   |   |   |                        |  |                    |
| 2. Antero-lateral border with small teeth in front of the large lateral epibranchial spines: spines of inner edge of hand not curved.   | <table border="0"> <tr> <td>a. No spines in middle line of carapace, or on branchial regions.....</td> <td><i>L. hoplonotus</i>.</td> </tr> <tr> <td>b. Some spines in middle line of carapace, and on branchial regions: spines on outer edge of hand very long.....</td> <td><i>L. whitei</i>.</td> </tr> </table>  | a. No spines in middle line of carapace, or on branchial regions.....   | <i>L. hoplonotus</i> .  | b. Some spines in middle line of carapace, and on branchial regions: spines on outer edge of hand very long.....                      | <i>L. whitei</i> .  |   |                        |  |                    |
| a. No spines in middle line of carapace, or on branchial regions.....   | <i>L. hoplonotus</i> .   |   |                         |   |   |   |                        |  |                    |
| b. Some spines in middle line of carapace, and on branchial regions: spines on outer edge of hand very long.....  | <i>L. whitei</i> .   |   |                         |   |   |   |                        |  |                    |

#### *Lambrus (Aulacolambrus) sculptus*, A. M.-Edw.

*Lambrus sculptus*, A. Milne-Edwards, Nouv. Archiv. du Mus., VIII. 1872, p. 258, pl. xiv. fig. 3.

*Lambrus sculptus*, Miers, 'Challenger' Brachyura, p. 98.

*Lambrus sculptus*, J. R. Henderson, Trans. Linn. Soc., Zool. (2) V. 1893, p. 350.

The carapace is triangular, broad behind, and as long as broad. The rostrum is triangular, dorsally grooved and declivous, and tapers

to a rounded point. The regions are elevated, and the median are separated from the branchial by deep furrows: all the regions are closely covered by rasp-like tubercles.

The lateral borders are tubercular, and end posteriorly in a large spine directed outwards and somewhat backwards.

Internal to this large spine is a much smaller spine; and the posterior border is tuberculate.

The chelipeds are a little more than twice the length of the carapace, with the inner and outer borders serrated, and the upper surface covered with tubercles like those on the carapace: amid the serrations five large teeth on the outer border of the hand are very conspicuous.

The ambulatory legs are slender and smooth.

The epistome is sculptured, and is very deeply excavated in the middle line.

The pterygostomian region is traversed by a canal running parallel with the buccal frame: the canal is perfectly smooth, and is closed below, and thus converted into a tube, by thick fringes of long hairs.

I believe, with Ortmann, that this species is very probably identical with *L. pisoides*, Adams and White ('Samarang' Crustacea, p. 28, pl. v. fig. 4), and perhaps with *L. diacanthus* de Haan (Faun. Japon. Crust., p. 92, pl. xxiii. fig. 1).

It is a fairly common species at the Andamans and Nicobars.

*Lambrus (Aulacolambrus) hoplonotus*, Ad. & Wh.

*Lambrus hoplonotus*, Adams and White, 'Samarang' Crust., p. 35, pl. vii. fig. 3.

*Lambrus hoplonotus*, A. Milne-Edwards, Nouv. Archiv. du Mus., VIII. 1872, p. 258.

*Lambrus hoplonotus*, Miers, Ann. Mag. Nat. Hist., 1879, Vol. IV. p. 22; and 'Challenger' Brachyura, p. 98.

*Lambrus hoplonotus*, Haswell, P. L. S., N. S. Wales, Vol. IV. 1879, p. 450; and Cat. Austral. Crust., p. 33.

Carapace with the outline in front of the huge lateral epibranchial spine almost semi-circular, the rostrum being extremely short and not breaking through the general outline. The carapace is granular, and has the regions well-defined but not elevated.

The symmetrically rounded antero-lateral margin is regularly festooned with little round teeth of uniform size, and ends at a great projecting lateral epibranchial spine: behind and internal to this spine is another small spine: the posterior border is finely granular. The chelipeds, legs, and margins of the carapace are fringed with long hairs; and the pterygostomian region is channelled just as in *L. sculptus*.

The chelipeds in the male are a little more, and in the female a



little less than three times the length of the carapace: the arms and hands are depressed trigonal, and the fingers small: the arm has its inner edge sharply tuberculate, its outer edge strongly 4 or 5-spinate, its lower edge beaded, its upper surface with a row of 4 or 5 large granules: the wrist has three strong spines along its outer edge: the hand has its inner edge sharply 9 to 11-dentate, its outer edge very strongly 6 to 8-spinate, with small spinules alternating with the large spines, and its lower edge sharply and finely beaded. The ambulatory legs are perfectly smooth.

All our specimens are typical according to Adam and White's figure. This species is common at the Andamans.

*Lambrus (Aulacolambrus) curvispinis*, Miers.

*Lambrus curvispinis*, Miers, Ann. Mag. Nat. Hist., Vol. IV. 1879, p. 24; and 'Challenger' Brachyura, p. 98.

This species, which Miers in his latest notice of it considers to be one of the numerous varieties of *L. hoplonotus*, resembles the latter species in every particular except (1) that the rostrum ends in a little bacillar spinule; (2) that the antero-lateral borders of the carapace instead of being crenate are powerfully spinate; (3) that the spines along the inner edge of the palm are strongly hooked upwards and outwards; and (4) that the inner surface of the arm bears a row of spinules.

This species, or variety, which is twice the size of *L. hoplonotus*, is also very common at the Andamans.

*Lambrus (Aulacolambrus) whitei*, A. M.-Edw.

*Lambrus carinatus*, Adams and White (*nec* Edw.), 'Samarang' Crust., p. 27, pl. v. fig. 3.

*Lambrus whitei*, A. Milne-Edwards, Nouv. Archiv. du Mus., VIII. 1872, p. 260; and Miss. Sci. Mex. Crust., I. p. 147 (foot-notes).

*Lambrus whitei*, Miers, 'Challenger' Brachyura, p. 98.

In the form of the carapace, the hairiness of the edges of the legs and carapace, and in the presence of the pterygostomial canal, this species almost exactly resembles the two preceding species.

The antero-lateral borders are sharply crenulate and end at a large outwardly and backwardly directed spine, internal to which is another largish spine; while on the posterior border are four largish spines. The carapace is granular, and in the middle line are two conical spines, one on the gastric the other on the cardiac region, while on either branchial region are two similar spines.

The spinature of the chelipeds is, in disposition, similar to that

of *L. hoplonotus*, but the spines, especially those on the outer edge of the hand, are very much longer, slenderer, and more acute.

Several specimens, including ovigerous females, of this small species are in the Museum collection, from Arakan; and from off Ceylon, 34 fathoms.

The figure in Adams and White is an admirable illustration of this species.

#### Sub-genus *PARTHENOLAMBRUS*, A. M.-Edw.

*Parthenolambrus*, A. Milne-Edwards, Miss. Sci. Mex. Crust., I. p. 148.

*Parthenopoides*, Miers, Journ. Linn. Soc., Zool., Vol. XIV. 1879, p. 672.

*Parthenolambrus*, Miers, 'Challenger' Brachyura, p. 99.

Carapace semi-elliptical or semi-circular, with a nearly straight posterior margin, the postero-lateral angles being strongly produced. Chelipeds of no great length, never sharply serrate, and with the arms and hands indefinitely contorted. The rostrum is more or less deflexed.

#### Key to the Indian species of the sub-genus *Parthenolambrus*.

- I. Carapace with the hepatic regions very prominent in the antero-lateral margin :—
  1. Carapace broader than long, strongly convex, nodular and eroded: chelipeds less than twice the length of the carapace ..... *L. tarpaius*.
  2. Carapace as long as broad, compressed, with cristiform edges, its surface almost devoid of granules: chelipeds more than twice the length of the carapace ..... *L. harpax*.
- II Carapace with the hepatic regions distinct, but not markedly prominent :—
  1. Rostrum almost vertically deflexed: ambulatory legs *dentate*, but without true spines ..... *L. calappoides*.
  2. Rostrum moderately deflexed, with a prominent median lobe: meropodites of ambulatory legs each with three rows of close sharp spines..... *L. beaumontii*.

#### *Lambrus (Parthenolambrus) calappoides*, Ad. and Wh.

*Parthenope calappoides*, Adams and White, 'Samarang' Crustacea, p. 34, pl. v. fig. 5.

*Lambrus calappoides*, Haswell, P. L. S., N. S. Wales, Vol. IV. 1879, p. 452; and Cat. Austral. Crust., p. 35.

*Lambrus calappoides*, Miers, Zoology of H. M. S. 'Alert,' pp. 517 and 527; and 'Challenger' Brachyura, p. 101.

*Parthenolambrus calappoides*, R. I. Pocock, Ann. Mag. Nat. Hist., 1890, Vol. V. p. 75.

Carapace almost semi-circular in outline, with an indentation

behind the hepatic regions: the regions are well-delimited, but not carinated or sharply raised; and the surface is granular without any very large spines or nodules. The rostrum is deflexed almost vertically. The eyes are sunk in deep orbits with swollen margins. The antero-lateral margins, and sometimes the postero-lateral, are closely festooned or incised, but in an irregular manner.

On either side of the gastric region is a deep hollow; and on either side of the front part of the cardiac region is a deep foramen.

The chelipeds in the male are not twice the length of the carapace: the arm is coarsely spinate along its convex inner border, and the hand still more coarsely and bluntly spinate along its contorted upper border.

Ambulatory legs compressed, the 3rd to 5th joints having the edges irregularly dentate, this being most marked in the case of the last pair.

The animal as a whole has a sort of boiled appearance.

The species is very variable, and owing to frequent and extensive incrustation with barnacles, foraminifera, etc., is very hard to describe.

In the Museum collection are specimens from the Andamans, Mergui, Arakan, Ceylon, and Malabar coast.

*Lambrus (Parthenolambrus) boumentii*, n. sp.

Very near to *Parthenope bouvieri* and *trigout*, A. M.-Edw. (v. Rev. et. Mag. Zool. (2) XXI. 1869. pp. 350-353).

This species comes from deepish water, and is small and very variable—the adult female, especially, being so unlike the male, that if it were found apart, it would be considered distinct.

The carapace is semicircular, the curve being broken (1) by the hepatic regions, and (2) by the projecting middle lobe of the rostrum. The elegantly curved antero-lateral borders are closely festooned by a row of thin, sharp, laciniated teeth, the bases of which are fused together; of these teeth the first three, situated on the hepatic region, are smaller than the others, which are of equal size, except the last, and this forms the summit of the salient upcurved postero-lateral angle. The postero-lateral borders are irregularly serrated, and there is a spinule in the middle of the posterior border. The regions of the carapace are very salient and form three cariniform elevations: there is usually, but not always, in the male, and seldom in the female, a recurved spinule on the gastric region, in the middle line; and generally in the male, but seldom in the female, the conical cardiac region is surmounted by one or two spinules.

The rostrum is trilobed, the small lateral lobes being formed each of a group of granules, and the larger, projecting, median lobe being spathulate, smooth, and somewhat deflexed.

The surface of the carapace is somewhat granular and eroded, but this is often concealed by a glazing of stony algæ.

The orbits have the edges finely and evenly serrate. The third joint of the antennal peduncle is spiniferous.

The segments of the sternum, as also the abdominal terga, are all deeply cut, and their surface, like that of the external maxillipeds and pterygostomian regions, is very sharply, closely and evenly granular.

The chelipeds in the male are  $2\frac{2}{3}$  times the length of the carapace; in the female hardly twice that length: in both sexes they are top-heavy, owing to the distal enlargement of the palm and the great size of the fingers; they are everywhere granular, but most markedly so on the under surface: the inner border of the arm and palm, and the upper border of the movable finger, are irregularly spinulate, the outer border of the hand may have two or three irregularly disposed blunt teeth, and that of the arm a few spicules. The ambulatory legs characterize this species, for the meropodites, in all, are compressed-trigonal with all three edges strongly, sharply and closely spinate; the anterior, and often also the posterior, margins of the next two joints also are spinate or dentate.

	Male.	Female.
Greatest length of carapace .	10.5 millim.	9 millim.
„ breadth „ .	10.5 „	9 „
Length of chelipeds .	29 „	15.5 „
<i>Loc.</i> Off Ceylon 32-34 fms., and off the Andamans, 41 fms.		

*Lambrus* (*Parthenolambrus*) *tarpeius*, Ad. and Wh.

*Lambrus tarpeius*, Adams and White, 'Samarang' Crust., p. 35, pl. vii. fig. 2.

*Lambrus tarpeius*, Miers, 'Challenger' Brachyura, p. 99.

Carapace covered with numerous large nodules, and with the division into three lobes—a median and two lateral—well-marked. The hepatic region not only projects very strongly forwards, but is brought into greater prominence by the fact that the carapace is somewhat contracted behind the eyes, and excavated and constricted behind the hepatic regions themselves: the antero-lateral margins are crenulate; the produced postero-lateral angle ends in a rounded lobe-like spine, and the posterior and postero-lateral margins are irregularly and bluntly toothed.

The rostrum, which is deeply excavated and considerably deflexed, ends in a blunt point.

The chelipeds are massive and nodular, but even in the male are only about half as long again as the carapace.

The ambulatory legs have the 3rd, 4th and 5th joints compressed and irregularly dentate along one or both edges.

Our specimens, which are rather damaged, come from the Andamans to 20 fathoms, and from off Colombo, 26½ fathoms.

*Lambrus (Parthenolambrus) harpar*, Ad. and Wh.

*Lambrus harpar*, Adams and White, 'Samarang' Crustacea, p. 25, pl. vi. fig. 3.

*Lambrus harpar*, Haswell, P. L. S., N. S. Wales, Vol. IV. 1879, p. 450; and Cat. Austral. Crust., p. 32.

*Lambrus harpar*, Miers, Zoology H. M. S. 'Alert,' pp. 182 and 202; and 'Challenger' Brachyura, p. 99.

*Male*. Carapace depressed semi-elliptical, as long as broad, its surface almost smooth. The median region is carinated, the carina bifurcating anteriorly to enclose an elongate-triangular depression behind the eyes, and carrying a large spine in the gastric region (at the point of bifurcation), another large spine in the cardiac region, and a much smaller spine in front of the latter.

The lateral margins are cristiform, with a series of crenations and sutures indicating fused teeth; and the hepatic region is prominent, with a cristiform edge: the postero-lateral angle is surmounted by an upturned lacinated tooth, the postero-lateral margins are dentate, and on the posterior border is a triangular tooth with an obscurely trilobed tip: from the bluntly lacinated tooth of the postero-lateral angle a carina runs obliquely forwards and inwards onto the posterior part of the branchial region.

The rostrum is strongly deflexed, and ends in an obscurely and unevenly trilobed tip. The chelipeds in the male are nearly  $2\frac{1}{2}$  times the length of the carapace, and are thin and compressed, with sharp, almost cristiform, edges: in the *arm* both the inner and outer edges are unevenly dentate, and the lower edge faintly granular: the *carpus* has the outer edge compressed and crenulate: the thin *hand* has its inner edge crenulate, has a curved line of granules on its inner surface, and some granules on its outer surface: the movable *finger* has its upper edge crenulated at base. The ambulatory legs are compressed, with the 3rd, 4th and 5th joints cristated above, especially in the last two pairs: in the last pair these joints have both margins rather strongly dentated.

Our specimen is from the Andamans.

Miers (Zoology H. M. S. 'Alert,' p. 202) considers *L. sandrockii*,

Haswell (P. L. S., N. S. Wales, Vol. IV. 1879, p. 452, pl. xxvii. fig. 2) to be identical with this species.

PARTHENOPE, Fabr.

*Parthenope*, Milne-Edw., Hist. Nat. Crust., I. 359, (v. *synon.*)

*Parthenope*, Miers, Journ. Linn. Soc., Zool., Vol. XIV. 1879, p. 668.

The form and structure of the carapace is somewhat similar to that of *Parthenolambrus*; but the genus is distinguished from *Lambrus* by the nature of the so-called basal antennal joint, which is relatively long, and nearly reaches to the level of the inferior orbital hiatus: the fingers also are much less turned inwards.

Key to the Indian species of the genus *Parthenope*.

- I. Carapace remarkably rugose or spinose: chelipeds nearly of the ordinary *Lambrus* form, and beset with huge spines: ambulatory legs strongly spinate:—
  1. Carapace and chelipeds beset with coarse tubercles and spines: carapace about  $\frac{2}{3}$  as long as broad..... *P. horrida*.
  2. Carapace and chelipeds beset with spines, which are sharp and lacinate on the chelipeds: carapace only  $\frac{2}{3}$  as long as broad ..... *P. spinosissima*.
- II. The whole body and all the appendages beset with delicate paxilliform tubercles which unite to form a lace-work or frosting: chelipeds tapering, with long slender spiny fingers, nearly as long as the palm (sub-genus *Parthenomerus*)..... *P. efflorescens*.

*Parthenope horrida*, Fabr.

Rumph, Amboin. Rariteitk. ix. 1.

? Seba, III. xix. 6-7.

*Cancer horridus*, Linn. Syst. Nat. II. 1047, 43.

? *Cancer horridus*, Herbst, I. ii. 222, tab. xiv. fig. 88.

*Parthenope horrida*, Fabr., Suppl., 353.

*Parthenope horrida*, Leach, Zool. Misc., II. 107.

*Parthenope horrida*, Desmarest, Consid. Crust., p. 143, pl. xx. fig. 1.

[*Parthenope horrida*, Guérin, Icon. R. A., pl. vii. fig. 1.]

*Parthenope horrida*, Milne-Edwards, Hist. Nat. Crust., I. 360.

*Parthenope horrida*, Cuv. Regn. An., pl. xxvi. fig. 2.

*Parthenope horrida*, A. Milne-Edwards, Nouv. Archiv. du Mus., VIII. 1872, p. 255.

*Parthenope horrida*, Martens, Archiv. fur Naturges., XXXVIII. 1872, p. 86 (note on habitat).

*Parthenope horrida*, Miers, Phil. Trans., Vol. 168. p. 486.

*Parthenope horrida*, Nauck, Z. Wiss. Zool., XXIV. 1880, p. 44 (gastric teeth).

*Parthenope horrida*, C. W. S. Aurivillius, Kongl. Sv. Vet. Ak., Handl. XXIII. No. 4, 1888-89, p. 60.

[*Parthenope horrida*, F. Muller, Verh. Ges., Basel., VIII. p. 473].

Carapace somewhat pentagonal ; its length not quite  $\frac{3}{4}$  its breadth ; its surface deeply eroded, strongly rugose, and sharply tubercular : its postero-lateral angle much produced outwards : antero-lateral margin coarsely spinate : postero-lateral and posterior margins granular, the former with a coarse spine. Rostrum short, moderately deflexed, ending in a blunt inter-antennular tooth. Orbits circular, deep.

Chelipeds huge, one much larger than the other, the larger twice the length of the carapace (in the female), covered with large coarse granular spines.

Ambulatory legs stout, spiniferous ; the dactylus smooth : the meropodite, in all, is compressed-trigonal, with all the edges spinate.

The under surface of the body has a worm-eaten appearance : the sternum is deeply pitted, with a deep crescentic excavation between the chelipeds.

The abdomen (of the female) with a series of deep excavations along either side.

Off Ceylon, 34 fathoms.

*Parthenope spinosissima*, A. M.-Edw.

Seba, III. xxii. 2 and 3.

*Parthenope spinosissima*, A. M.-Edw., in Maillard's l'île Réunion, Annexe F, p. 8, pl. xviii.

*Parthenope spinosissima*, Alcock, J. A. S. B., 1893, Pt. ii. p. 177.

Carapace in the form of an equilateral triangle, its length only about  $\frac{2}{3}$  its breadth ; its surface strongly rugose, and sharply tubercular and spinate : the antero-lateral borders are armed with large lacinate spines ; the posterior and postero-lateral borders are sharply spinate : the strongly-produced and spinate postero-lateral angle runs forwards as a carina onto the branchial regions.

The three lobes of the gastric region are greatly inflated.

The rostrum is vertically deflexed, and ends in a strong sharp inter-antennular spine.

The chelipeds are very little asymmetrical, and are beset, nearly up to the tips of the fingers, with great ramose and lacinate spines.

The ambulatory legs are armed with extremely sharp teeth almost up to the tip of the dactylus.

The abdomen of the female has a median double series, and on either side a single series, of sharp spines.

A male and female from the Bay of Bengal, 88 fathoms.

Sub-genus PARTHENOMERUS, nov.

Characterized by the chelipeds, which have a thigh-shaped meropodite, and taper to the fingers, which are nearly as long as the palm, and are extremely slender.

*Parthenope (Parthenomerus) efflorescens*, n. sp.

Carapace triangular, not quite  $\frac{3}{4}$  as long as broad; its entire surface, above and below, as also that of the sternum, of the abdomen (in the female), and of all the exposed appendages—from the eye-stalks to the last pair of ambulatory legs, covered with a lace-work, or frosting, formed by the partial contact of very delicate crisply paxilliform granules. There are no large tubercles, and, except on the arm hand and fingers, no spines. On the arm, namely, there are two or three teeth with acicular tips, on both the lower-inner, and the upper-inner borders; on the hand there are three needle-like teeth on the upper-inner, and three on the lower-inner borders; and the fingers are everywhere beset with long needle-like spines. The rostrum is nearly vertically deflexed.

Only one cheliped remains in our unique specimen; and it, which is a little over twice the length of the carapace, has a most curious tapering form: the meropodite is huge and thigh-shaped, decreasing in size distally; the carpus is slenderer than the end of the meropodite; and the hand is still slenderer than the carpus: the fingers are long—nearly as long as the palm—are extremely slender, and, as already noted, are beset with long slender spines.

A single female, from the Andaman Sea, 36 fathoms.

## CRYPTOPODIA, Edw.

*Cryptopodia*, Milne-Edwards, Hist. Nat. Crust., I. 360.

*Cryptopodia*, Miers, Journ. Linn. Soc. (Zool.), XIV. p. 669.

*Cryptopodia*, Miers, 'Challenger' Brachyura, p. 101.

Carapace very broadly triangular, with very large lateral clypeiform vaulted expansions which completely conceal the ambulatory legs, and are prolonged posteriorly far beyond the base of the abdomen; a large space between the gastric and the cardiac regions is triangular and concave. The rostrum is nearly horizontal, spatuliform and very prominent. The pterygostomian regions are smooth, not ridged. The orbits are very small, nearly circular, with a suture in the superior margin. The epistome is well developed; the antennular fossæ are narrow and somewhat oblique. The abdomen, in the male, is five-jointed; the third to fifth segments coalescent. The eyes are very small and retractile. The basal antennal joint is slightly dilated and does not nearly reach the internal orbital hiatus, which is filled by the second joint. The buccal cavity and external maxillipeds are small. The ischium-joint of the maxillipeds is not produced at its antero-internal angle; the merus is distally truncated, with the antero-external angle slightly produced, the interior margin notched below the antero-internal angle. The chelipeds are nearly as in *Lambrus*; the merus-joint has a wing-like lobe on the posterior margin near to the distal extremity; the



palms of the chelipeds are elongated, tricarinated, and dentated (as in *Lambrus*); fingers short. The ambulatory legs are slender, decrease successively but slightly in length, and have the fourth, fifth and sixth joints more or less distinctly carinated; dactyli nearly straight.

*Cryptopodia fornicata*, (Fabr.)

*Cancer fornicatus*, Fabr., Ent. Syst., II. 453.

*Cancer fornicatus*, Herbst, I. ii. 204, pl. xiii. figs. 79-80.

*Parthenope fornicata*, Fabr., Suppl., p. 352.

*Maia fornicata*, Latr., Hist. Nat. Crust., VI. 104.

*Oethra fornicata*, Desmarest, Consid. Crust., p. 110.

*Cryptopodia fornicata*, Milne-Edwards, Hist. Nat. Crust., I. 362 (*v. synonym.*)

*Cryptopodia fornicata*, de Haan, Faun. Japon. Crust., p. 90, pl. xx. figs. 2 and 2a; and (?) Adams and White, 'Samarang' Crust., p. 32, pl. vi. fig. 4; and Dana, U. S. Expl. Exp. Crust., pt. I. p. 140; and Stimpson, Proc. Ac. Nat. Sci., Philad., 1857. p. 220; and Haswell, P. L. S., N. S. Wales, Vol. IV. 1879, p. 454; and Cat. Austral. Crust., p. 37; and E. Nauck, Z. Wiss. Zool., 1880 (gastric teeth); and Miers, Zool. H.M.S. 'Alert,' pp. 182 and 203; and 'Challenger' Brachyura, p. 102; and A. O. Walker, Journ. Linn. Soc., Zool., Vol. XX. 1890, p. 109; and J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 351.

Carapace broadly triangular, depressed: the antero-lateral margins more or less lacinated, the posterior and postero-lateral margins forming one strong curve, the edge of which is either unbroken or shows very faint traces of crenulation: the surface of the carapace is in the main smooth, but the triangular depression is a little pitted and is bounded by lines of granules, the lateral lines being produced well across the branchial regions. The rostrum is prominent, blunt-pointed, about as long as broad, and has its edge very faintly crenulate.

The chelipeds are considerably less than twice the length of the carapace, and have massive sharply trigonal joints, with most of the edges strongly cristiform; and the fingers are massive and strongly incurved as in *Lambrus*: in the *arm*, the cristiform inner and outer edges are sharply laciniate, the latter being strongly alate, while the lower edge is beaded: in the *carpus* the outer edge only is cristiform: in the hand both the inner and outer edges are strongly cristiform and laciniate, the lower edge being crenate.

The ambulatory legs have both edges of the merus raised into spiniform crests, and the upper edges of the next two joints carinate.

In the Museum collection are numerous specimens from Palk Straits, Andamans and Persian Gulf.

*Cryptopodia angulata*, Edw. and Lucas.

*Cryptopodia angulata*, Edw. and Lucas, Archiv. du Mus., Vol. II. 1841, p. 481, pl. xxviii. figs. 16-19.

Carapace convex, sharply pentagonal, with all the edges deeply

dentated, and all the angles produced to form curved spines; in addition there is a second spine in front of the spine of either antero-lateral angle, and the part of the posterior border that is co-extensive with the abdomen is demarcated on either side by a strong spine. The rostrum ends in a sharp point. The triangular depression of the carapace is very deep, and the lines which bound it are granular; there is an irregular patch of granules on either branchial region, and there is a line of granules passing forwards from the apex of the triangular depression to the base of the rostrum on either side.

The chelipeds are much as in *C. fornicata*, with the exception that the carpus is semi-globular, and that the inner and outer margins both of the hand and arm are armed with sharp lacinate spines. The ambulatory legs have the merus simply carinate above, spinate-carinate below, the carpus and propodite carinate, and the dactylus strongly carinate on both edges so as to form a swimming blade.

Orissa coast, 20-25 fathoms. Malabar coast, 28 fathoms.

In a large male from the Malabar coast, the carapace is much more granular; and the chelipeds have the spinature much more acute and lacinate, and their surfaces—especially the under surface—granular instead of nearly smooth.

*Cryptopodia angulata*, var. *cippifer*, nov.

In this variety the only differences are: (1) that the semi-globular carpus has a few granules on its upper surface; and (2) that the triangular hollow in the middle of the carapace is rather deeper, and has certain large erect definitely-placed spines on the ridges that bound the hollow, namely,—two close together side by side in the middle line, in front; one at either branchial angle; and one in the middle line posteriorly, on the summit of the cardiac region.

These spines are present in six specimens of both sexes, but are most pronounced in the male.

*Loc.* Karáchi.

The largest specimen, female, has an extreme breadth of carapace of 45 millim.

HETEROCRYPTA, Stimpson.

*Heterocrypta*, Stimpson, Ann. Lyc. Nat. Hist., New York, Vol. X. 1874, p. 102.

*Heterocrypta*, A. Milne-Edwards, Miss. Sci. Mex., Crust., I. p. 166.

*Heterocrypta*, Miers, J. L. S., Zool., Vol. XIV. 1879, p. 669; and 'Challenger'

*Brachyura*, p. 102.

Differs from *Cryptopodia* in the following characters:—

The posterior border of the carapace slightly overlaps the abdomen, but is not distinctly produced; the lateral clypeiform expansions are also less produced, so that the legs when even moderately extended can be seen beyond them.

The pterygostomian and sub-hepatic regions are traversed by a granular ridge which runs parallel to the antero-lateral border from the angle of the buccal cavity to the base of the chelipeds.

*Heterocrypta investigatoris*, n. sp.

Carapace broadly pentagonal; the posterior border almost straight, and crenulated; the other borders sharply dentate. The central depression of the carapace is semi-circular and very deep, with the boundary raised into a carina: the horns of the semi-circle end each in a boss or mammillary tubercle, from which a carina runs backwards to the posterior angle of the carapace. The rostrum is very large and prominent, shaped like a leaf: its surface is smooth: that of the carapace is either smooth or granular—the granules, when present, being most abundant on the posterior part of the branchial regions.

The chelipeds, which are twice the length of the carapace, have both the inner and outer edges of the *arm* sharply dentate (but not alate as in *Cryptopodia*), and the lower edge beaded: the *carpus* is subglobular: the *hand* has both the inner and the outer edges bluntly dentate, and the under surface closely covered with bead-like granules.

The ambulatory legs have the upper edges of the 3rd, 4th, and 5th joints sharply carinate: the meropodite also, in the case of the first two pairs of legs, has a single row of teeth or spines along its lower edge, and in the case of the last two pairs of legs has a double row of spines along the lower edge.

Like all the species of this genus, this species is small, the breadth of the carapace in the largest specimen being 18 millim.

It is not uncommon off rocky parts of the coasts of India up to and about 30 fathoms. It would seem to be allied to the *Cryptopodia contracta* of Stimpson (Proc. Ac. Nat. Sci., Philad., 1857, p. 220).

OETHRA, Leach.

*Oethra*, Leach.

*Oethra*, Milne-Edwards, Hist. Nat. Crust., I. 370.

*Oethra*, A. Milne-Edwards, Miss. Sci. Mex., Crust., I. p. 170 (v. *synon.*).

*Oethra*, Miers, Journ. Linn. Soc., Zool., Vol. XIV. 1879, p. 669.

The carapace is regularly oval (transversely), with its surface strongly rugose, and its antero-lateral edges somewhat upturned. The

rostrum is obsolete, not breaking the general oval outline. The eyes are small; and the orbits are nearly circular, with two sutures in the upper border, and a hiatus at the inner inferior angle, which is filled by the second joint of the antennary peduncle.

The antennular fossæ are squarish, and are nearly filled by the large angular basal joint, internal to which the rest of the antennule folds obliquely.

The basal antennal joint is oblong and angular, and reaches to the internal orbital canthus: the antennary flagella are rudimentary.

The external maxillipeds completely close the buccal frame: their inner border is extremely straight and sharp cut: their palp is inserted at the antero-internal angle of the merus, and folds out of sight.

The chelipeds are about equal in length to the carapace: they have somewhat the *Lambrus* form—having sharply prismatic joints and large inturned fingers, but are concave on the upper surface.

The ambulatory legs are short, and decrease gradually in length: they are all strongly dentate-carinate, or cristate.

The abdomen of the female (and young male) consists of seven segments.

### *Oethra scruposa*, L.

[*Cancer scruposus*, Linn., Mus. Lud. Ur., p. 450.]

*Cancer polynome*, Herbst, III. ii. 23, tab. liii. figs. 4-5.

[*Oethra depressa*, Lamk., Hist. Anim. Sans. Vert., V. 265.]

*Oethra depressa*, Desmarest, Consid. Crust., p. 110, pl. x. fig. 2.

[*Oethra depressa*, Guérin, Icon. R. A., pl. xii. fig. 3.]

*Oethra scruposa*, Milne-Edwards, Hist. Nat. Crust., I. 371.

*Oethra scruposa*, Cuv., R. A., pl. xxxviii. fig. 2.

*Oethra scruposa*, Stimpson, Proc. Ac. Nat. Sci., Philad., 1857, p. 221.

*Oethra scruposa*, A. M.-Edw., in Maillard's Île Réunion, Annexe F., p. 3; and Nouv. Archiv. du Mus., VIII. 1872, p. 263.

*Oethra scruposa*, Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 351.

[*Oethra scruposa*, F. Muller, Verh. Ges., Basel, VIII. 473.]

(*Oethra scruposa*, var. *scutata* A. Milne-Edwards, Miss. Sci. Mex., Crust., I. p. 170, pl. xxxi. fig. 2 = *Oethra scutata*, S. I. Smith, Amer. Journ. Sci., etc., XLVIII. 1869, p. 120; and Ann. Mag. Nat. Hist., Vol. IV. p. 230, is considered by M. A. Milne-Edwards to be only a variety of the Linnæan type.)

The antero-lateral borders are divided into 6 or 7 indistinct lobes by deep narrow sutures, each fold being again subdivided near the edge by a faint crest.

The gastric region is extremely prominent, and is divided into two lobes by a broad longitudinal channel, each lobe being sparsely granular: the branchial regions are also somewhat convex near their middle, the

convexities being granular: the rest of the carapace is somewhat concave.

The chelipeds and ambulatory legs are rough: the chelipeds have the lower edge sharply dentate, and the outer edge of the carpus sharply dentate: the ambulatory legs have the 3rd, 4th and 5th joints carinate or cristate above, and the 3rd and 5th joints cristate below: the dactyli are cristate on both edges, and end in little claws.

The abdomen is deeply sculptured.

In the Museum collection is a male from the Andamans, and a female from Ceylon.

#### Sub-family II. EUMEDONINÆ, Miers.

Miers, Journ. Linn. Soc., Zool., Vol. XIV. 1879, p. 670.

Carapace rhomboidal or pentagonal, with a spine at the junction of the antero-lateral and postero-lateral borders. Rostrum usually bifid or emarginate. Surface of carapace nearly flat. Chelipeds of moderate size and length.

##### *Key to the Indian genera of the sub-family EUMEDONINÆ.*

- I. Floor of the orbit not in contact with the front, but leaving a hiatus which is more or less filled by the second joint of the antennal peduncle. Chelipeds armed with large spines: ambulatory legs compressed:—
  1. Spine of antero-lateral angle of carapace directed forwards..... ZEBRIDA.
  2. Spine of antero-lateral angle directed straight outwards; last pair of legs dorsal in position... EUMEDONUS.
- II. Floor of the orbit meeting the front, so as to completely exclude the antennal peduncle from the orbit: chelipeds not armed: ambulatory legs not compressed ..... CERATOCARCINUS.

#### ZEBRIDA, Adams and White.

*Zebrida*, Adams and White, 'Samarang' Crustacea, p. 23.

*Zebrida*, Miers, J. L. S., Zool., Vol. XIV. 1879, p. 670.

Carapace sub-rhomboidal, flattened, with the rostrum formed by two large, acute, laminar, almost parallel teeth; and with the antero-lateral angles produced to form two similar laminar teeth projecting forwards in a plane parallel to the rostrum.

Orbits circular, their inner canthus being filled by part of the antennal peduncle.

The antennules fold obliquely. The antennæ are entirely concealed beneath the rostrum: their flagellum is well developed; and their basal joint is longish, reaching to the inner canthus of the orbit.

The chelipeds are stout but short, the legs are compressed, and both are armed with large laminar spines of the same type as those that form the rostrum and the antero-lateral margins of the carapace. The ambulatory legs are subchelate much as in *Acanthonyx*.

*Zebrida adamsii*, White.

*Zebrida adamsii*, White, P. Z. S., 1847, p. 121; and Ann. Mag. Nat. Hist., 1848, Vol. I. p. 223; and 'Samarang' Crustacea, p. 24, pl. vii. fig. 1.

*Zebrida adamsii*, J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 351.

*Zebrida longispina*, Haswell, P. L. S., N. S. Wales, Vol. IV. 1879, p. 454, pl. xxvii. fig. 3; and Cat. Austral. Crust., p. 38.

Body of a light delicate madder pink, the carapace with darker (liver-coloured) parallel longitudinal bands and alternating streaks, the legs and chelipeds with broad somewhat oblique cross-bands of the same darker colour: the median longitudinal dark band, and a band on either side of it, extend, discontinuously, from the carapace along the abdomen.

The entire integument of the body and limbs is smooth, hard, and polished. The chelipeds are stout, with short squat joints: the *arm* is trigonal with sharp-cut laminar edges, the upper and lower of which end in sharp teeth; its broad distal end is also dentate: the *wrist* is surmounted by three laminar teeth disposed in a triangle: the *hand* has its upper edge raised into a compressed tooth.

Of the ambulatory legs the 3rd, 4th, and 5th joints are strongly compressed, with the upper edges sharply and acuminate carinate; the fifth joint is enlarged distally, and the strongly recurved dactylus is retractile against it in the manner of a subchela.

In the Museum collection are a male and female from the coast of Travancore.

*Eumedonius*, Edw.

*Eumedonius*, Edw., Hist. Nat. Crust., I. 349.

*Eumedonius*, Miers, J. L. S., Zool., Vol. XIV. 1879, p. 670.

Carapace depressed, pentagonal: rostrum large, strongly prominent, bifurcate only near the tip. Orbits circular; their internal hiatus occupied by part of the antennal peduncle. Antennules folding obliquely; their basal joint of large size.

Antennæ entirely concealed beneath the front; both the peduncle and the flagellum short. Chelipeds more massive than the other legs, and in the male much longer; armed with large spines. Ambulatory legs compressed; their third joint cristate; the second pair a little shorter than the third; the fifth pair dorsal in position. The abdomen in both sexes consists of seven separate segments.

*Eumedonius zebra*, n. sp.

Carapace, in spirit, of a yellow colour, and traversed fore-and-aft by five broad parallel liver-coloured bands—a median and two lateral: the median and the inner lateral band on either side being continued a certain distance on to the abdomen.

The carapace is sharply pentagonal, the antero-lateral angles being sharp and directed straight outwards.

The rostrum forms a long, broad, sub-triangular lamina bifurcated near the tip.

The chelipeds in the female are about the same length as the carapace: the ischium has a sharp tooth on its inner border, the merus has one on its inner and one on its upper margin, the carpus has a very strong one on its upper border, and the hand has two on its upper border: the legs have the merus strongly compressed, with the upper border dentate or cristate, and the dactyli are strongly recurved.

Two ovigerous females from off Ceylon, 32 fms: the extreme length of the carapace of the larger specimen is 10 millim.

## CERATOCARCINUS, Adams and White.

*Ceratocarcinus*. Adams and White, Proc. Zool. Soc., p. 57, 1847; and 'Samarang' Crust., p. 33.

*Ceratocarcinus*, Miers, Journ. Linn. Soc., (Zool.) XIV. p. 670, 1879; and 'Challenger' Brachyura, p. 104.

Carapace sub-hexagonal, about as broad as long, with the dorsal surface nearly flat, spinose or tuberculated. The spines of the rostrum are elongated, acute, and separated by a rather wide interspace, and there is a well-developed lateral epibranchial spine. The orbits are small and circular, and the sub-ocular lobe joins the front, so as completely to exclude the antennæ from the orbits. The basal joint of the antennæ is slender and like the greater part of these appendages is hidden beneath the front. The external maxillipeds are small, the ischium-joint not produced at its antero-internal angle, the merus distally truncated, not produced at the antero-external angle, and scarcely emarginate at the antero-internal angle, where the next joint articulates. The chelipeds are relatively slender and somewhat elongated, with the joints not dilated, the merus and carpus sometimes armed with spines; the dactyli acute and shorter than the palms; the ambulatory legs are slender, with the joints not dilated, the merus sometimes armed with a distal spine; the dactyli nearly straight.

*Ceratocarcinus longimanus*, Ad. and Wh.

*Ceratocarcinus longimanus*, White, P. Z. S., 1847, p. 57; and Ann. Mag. Nat. Hist., 1847, Vol. XX. p. 62; and 'Samarang' Crustacea, p. 34, pl. vi. fig. 6.

*Ceratocarcinus longimanus*. Miers. 'Challenger' Brachyura, p. 105.

Carapace hexagonal: the spines of the rostrum far apart: lateral angles of the carapace in the form of stout outstanding spines the tips of which are turned forwards: a pair of sharp tubercles in the middle line behind the rostrum—these being tufted with hairs.

Chelipeds stout, about twice the length of the carapace and rostrum, finely granular, and longitudinally grooved.

A single specimen of this small species, from the Malacca Straits, is in the Museum Collection.

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*Appertic to sub-family ACANTHONYCHINÆ.*

*MENÆTHIOPS*, n. gen.

Closely allied to *Menæthius*.

Carapace pyriform, its surface smooth beneath a pubescent covering. The rostrum consists of two acute slender spines of moderate length, which are in the closest contact throughout.

The eyes, which are movable forwards but not retractile, are in great part concealed beneath a large, very conspicuous, laminar supra-ocular spine. No post-ocular spine. [A spinule is present on the ventral aspect of the hepatic region of the single species.] The basal antennal joint is broad; and the mobile portions of the antennæ are visible, from above, on either side of the rostrum.

The external maxillipeds have the merus as broad as the ischium, and the palp inserted at the antero-internal angle of the merus.

The ambulatory legs, of which the first pair are longer than the rest, have strongly recurved prehensile dactyli.

The chelipeds in the female (male unknown) are not enlarged.

The abdominal segments in the female appear to be all distinct.

This genus has a superficial resemblance to *Oregonia*, Dana; but in *Oregonia* there is a large post-ocular spine, quite distinct from the hepatic angle, and the eyes are said to be retractile against this spine.

*Menæthiops bicornis*, n. sp.

Body and legs tomentose, with additional long scattered setæ.

Carapace pyriform, somewhat *Acheus*-like in shape, there being a slight constriction behind the eyes, and another slight constriction behind the hepatic regions: the gastric and cardiac regions very prominent, the branchial regions prominent: the surface, when denuded, smooth, except for a granular ridge on the pterygostomian regions; the hepatic regions are laterally rather prominent, and carry a small spinule



visible from above, on the ventral aspect of the antero-external angle, as well as a much smaller spinule on the dorsal aspect. There is also a spinule, in the middle line, on the gastric region, and one on the cardiac region, as well as one near the middle of either branchial region.

The rostrum consists of two slender acute spines, which are about one-fourth the length of the carapace proper, and are in the closest contact up to the very tips.

The eyes are movable forwards but are quite non-retractile backwards, and are in great part concealed beneath a large laminar supra-ocular spine, which has its anterior angle produced forwards and its posterior angle produced outwards. No post-ocular spine.

[The spinule on the ventral surface of the hepatic angle is in no sense a post-ocular spine.]

The basal antennal joint is broad and has its outer edge irregularly wavy, somewhat as in Dana's figure of *Oregonia gracilis* (U. S. Expl. Exp., Crust., I. pl. iii, fig. 2b.); its sharp antero-external angle is, like the following joints and the flagellum, plainly visible, from above, beside the rostrum: the mobile portion of the antenna is rather more than half the length of the carapace and rostrum.

The chelipeds in the female are not stouter than the other legs, and are shorter than the carapace and rostrum: their palm is nearly twice the length of the fingers, which meet only at the tip.

The ambulatory legs all have slender joints and a strongly recurved prehensile dactylus: the first pair, which are the longest, are, in the female, a little longer than the carapace and rostrum.

A single egg-laden female has the following dimensions:—

Length of carapace and rostrum	...	...	$6.2 + 2 = 8.2$	millim.
Greatest breadth of carapace	...	...	6.0	"
Length of chelipeds	...	...	7.0	"
Length of first ambulatory legs	...	...	8.5	"

Loc. Káráchi.

The place of the above genus in the "Key to the Indian genera of the sub-family *Acanthonychinæ*" (pp. 190 and 191 *ante*), is with *Huenia* and *Menæthius*, from both of which it is easily diagnosed (1) by the *Pisa*-like rostrum, consisting of two sharp slender spines in the closest contact throughout their extent, and (2) by the large antennary flagellum and by the eroded outer edge of the basal antennal joint. It has, indeed, the closest natural relations with *Menæthius*.

The unique specimen has only just been received along with the "Investigator" collections of the season 1894-95.

EXPLANATION OF PLATES.

PLATE III.

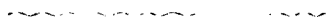
- Fig. 1. *Lambrachæus remifer*, ♂.  
,, 2. *Physachæus ctenurus*, ♂; 2a. abdomen of ♀ × 4; 2b. abdomen of ♂ × 4.  
,, 3. *Physachæus tonsor*, ♀.  
,, 4. 4a. *Grypachæus hyalinus*, ♀.

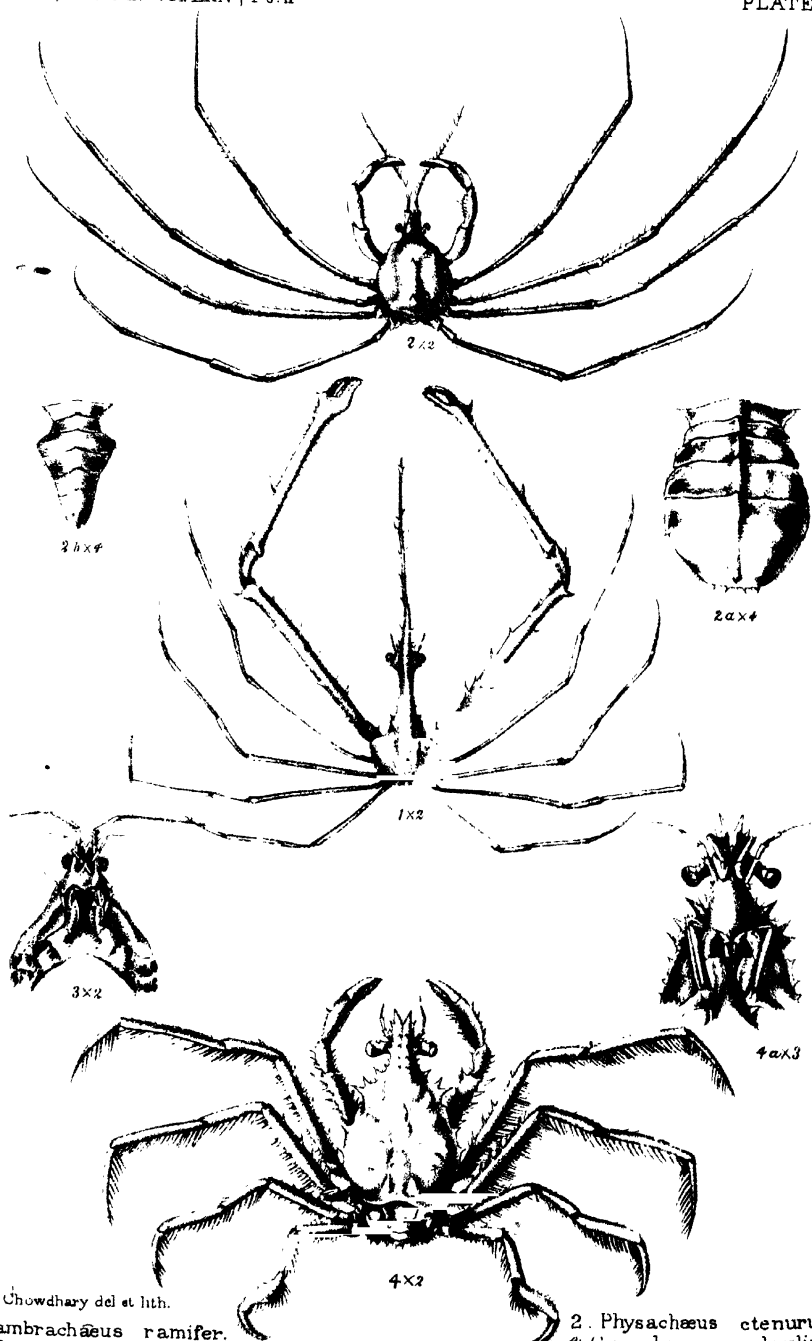
PLATE IV.

- Fig. 1. 1a. *Inachoides dolichorhynchus*, ♂.  
,, 2. 2a. *Apocremnus indicus*, ♂.  
,, 3. *Naxia investigatoris*, ♂.  
,, 4. *Macrocaloma nummifer*, ♂.  
,, 5. *Maia gibba*, ♂.

PLATE V.

- Fig. 1. *Achæus cadelli*, ♂.  
,, 2. 2a. *Chorilibinia andamanica*.  
,, 3. *Callodes malabaricus*, ♀.  
,, 4. 4a. *Paratymolus hastatus*, ♀.





A.C. Chowdhary del et lith.

1. *Lambrachæus ramifer*.

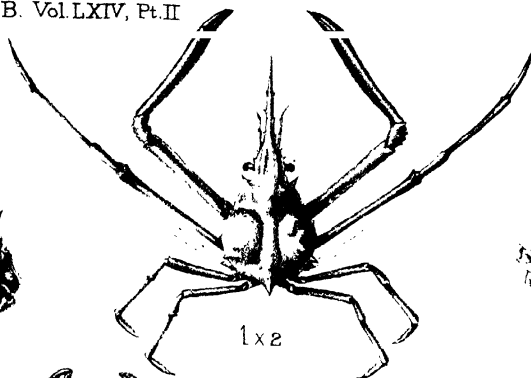
3. *Physachæus tonsor*.

2. *Physachæus ctenurus*.

4. *Grypachæus hyalinus*.



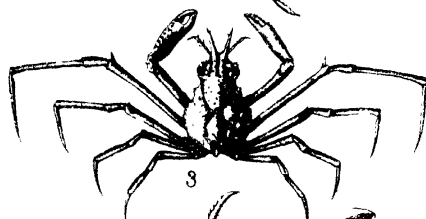
1a x 3



1 x 2



2a x 4



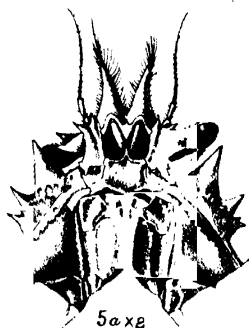
3



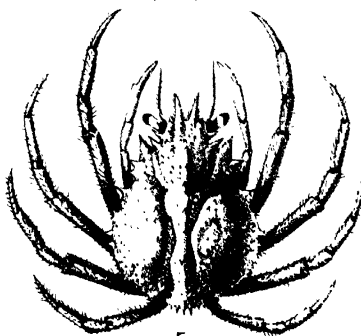
2 x 2



4 x 2



5a x 2



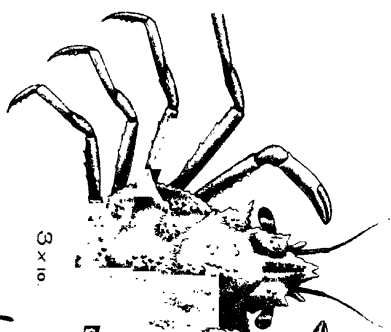
5

inwdhary & S C Mondul delet lith  
Inachoides dolichorhynchus.  
Naxia investigatoris. 5 Maia

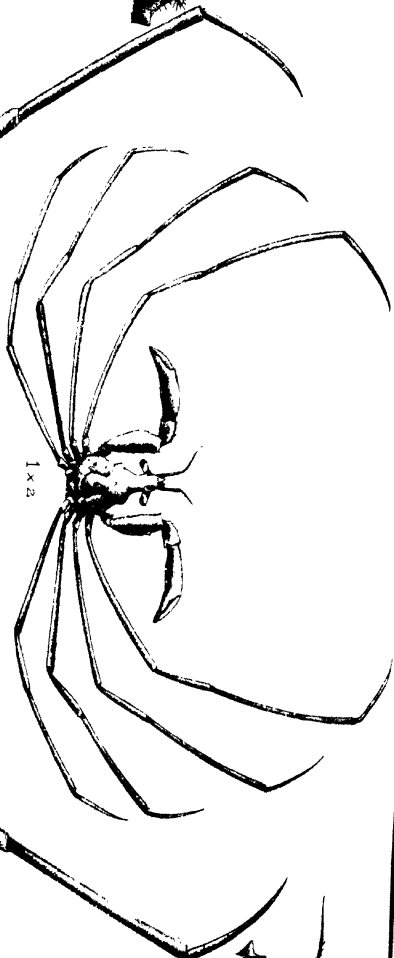
2 Apocremnus indicus.  
4 Macrocoeloma nummifer.  
gibba.



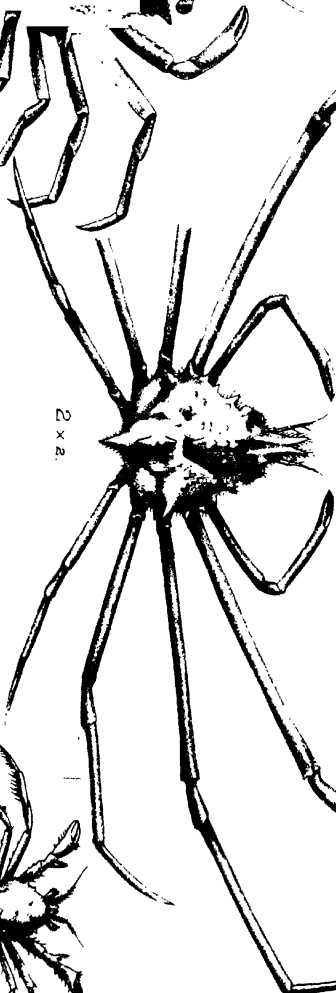
2x4



3x10



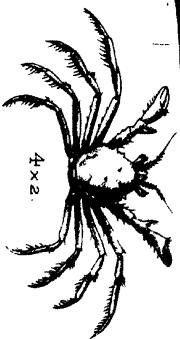
1x2



2x2



4x4



4x2

1. *Achaeus cadelli*.  
Sc. Mondul del

2. *Chorilibinia andamanica*. 3. *Colloides malabaricus*. 4. *Paratymolus hastatus*.  
A. Chowdhary lith.

MATERIALS  
FOR A  
CARCINOLOGICAL FAUNA OF INDIA.

No. 2.  
THE BRACHYURA OXYSTOMA.

BY  
A. ALCOCK, M.B., C.M.Z.S.,  
SUPERINTENDENT OF THE INDIAN MUSEUM.

*[Reprinted from the "Journal Asiatic Society of Bengal,"  
Vol. LXV, Part II, No. 2, 1896.]*

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CALCUTTA:  
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1896.

*From the Journal, Asiatic Society of Bengal, Vol. LXV. Part II, No. 2,  
1896.*

*Materials for a Carcinological Fauna of India. No. 2. The Brachyura  
Oxystoma.—By A. ALCOCK, M.B., C.M.Z.S., Superintendent of the  
Indian Museum.*

Plates VI—VIII.

Received 7th May. Read 3rd June.

The limits of the Tribe of Oxystoma here adopted are those originally established by De Haan in the *Fauna Japonica*, and since recognized by Ortmann in his account of the Decapod Crustacea of the Strasburg Museum.

I can hardly, however, go as far as Ortmann in uniting the *Leucosiidæ* and *Raninidæ* in one section, *Leucosiinea*, co-ordinate in value with the *Dorippinea* and *Calappinea*. Rather, it seems to me, the affinities of the *Raninidæ* are, through *Cyclodorippe*, with the *Dorippidæ*. But on the whole it seems enough to recognize the *Raninidæ* as true Oxystomes of equal rank with the *Calappidæ*, *Leucosiidæ* and *Dorippidæ*, just as De Haan practically does.

No one who has examined any of the deep-sea Dorippoids can, I think, find any difficulty in accepting De Haan's comprehensive views of the relations of the Oxystoma.

For instance, in the Indian genus *Cymonomops*\* (which differs but little from *Cyclodorippe*), although the general external form is as plainly as possible that of *Dorippe*, yet a detailed examination shows a number of Raninoid characters:—The chelipeds are Raninoid, so are the external maxillipeds (especially in their long narrow merus and short narrow exognath), so are the antennules: the fact also that the afferent branchial openings are not in front of the bases of the chelipeds is suggestive. In *Cyclodorippe*, moreover, the oviducts open, as in the *Raninidæ*, on the bases of the third pair of legs.

We have, in fact, in some of these deep-sea forms the clearest evidence of the close relation of the *Ranina* type to the *Dorippe* type, and quite sufficient justification for accepting De Haan's scheme of the Oxystoma almost without modification.

The following is a list of the known Indian genera of Oxystomes:—

**Calappidæ Calappinæ**:—*Calappa*, *Mursia*, *Cryptosoma*.

**Calappidæ Matutinæ**:—*Matuta*.

**Leucosiidæ Leucosiinæ**:—*Actæomorpha*, *Oreophorus*, *Tlos*, *Heteronucia* (nov.), *Ebulia*, *Nursia*, *Nucia*, *Parilia*, *Randullia*, *Myra*, *Leucosia*, *Onychomorpha*, *Philyra*, *Pseudophilyra*.

**Leucosiidæ Iliinæ**:—*Myrodes*, *Iphiculus*, *Pariphiculus* (nov.), *Nursilia*, *Heterolithadia*, *Arcania*, *Ixa*.

**Dorippidæ Dorippinæ**:—*Dorippe*, *Ethusa*.

**Dorippidæ Tymolinæ**:—*Cymonomops*.

**Raninidæ**:—*Notopus*, *Raninoides*, *Lyreidus*.

#### Tribe OXYSTOMA or LEUCOSOIDEA.

*Oxystomes*, Milne-Edwards, Hist. Nat. Crust. II. 96 *partim*), and *Raniniens* Milne-Edwards *op. cit.* II. 190.

OXYSTOMATA, DE HAAN, FAUN. JAPON. CRUST. pp. 111–119.

*Leucosoidea* vel *Oxystomata*, Dana, U. S. Expl. Exp. Crust. I. 389, and *Raninidea* vel *Anomura Leucosidica*, Dana, *op. cit.* pp. 400, 403.

*Oxystomata* or *Leucosiidea*, Miers, Challenger Brachyura, p. 337, and *Raninidea*, Henderson, Challenger Anomura, p. 26.

*Oxystomata*, Ortmann, Zool. Jahrbuch., Syst., VI. 1892, pp. 550, 551.

Epistome reduced or absent. The efferent branchial channels terminate in the middle of the buccal area, the buccal cavern is therefore produced forwards and is generally of an elongate triangular shape; and the efferent channels themselves, whether covered by the external maxillipeds or not, are immediately closed in by an elongate lamellar process of the exopodites of the first maxillipeds.

\* Illustrations of the Zoology of the 'Investigator,' Crustacea pl. xiv. fig. 9.



The afferent branchial openings are found either in the usual place in front of the bases of the chelipeds, or at the sides of the endostome.

Branchiæ from six to nine on either side.

The antennules fold either longitudinally or obliquely, very rarely transversely.

In the male the genital ducts protrude either through the bases of the fifth pair of legs or through the fifth thoracic sternum close by.

The *Oxystoma* may be divided into four families as follows:—

Family I. *Calappidæ*. Carapace of the ordinary brachyurous shape. The afferent branchial openings are found in front of the bases of the chelipeds. The antennæ are small. The legs are normal in position. The vasa deferentia perforate the bases of the fifth pair of legs. The branchiæ are nine in number on either side. The external maxillipeds either completely cover the buccal cavern and have their palp hidden in repose (*Matutinæ*), or do not close the buccal cavern and have their palp always exposed (*Calappinæ*).

Family II. *Leucosiidæ*. The carapace is of the ordinary brachyurous shape. The afferent branchial channels are found on either side of the endostome. The vasa deferentia perforate the sternum near the bases of the fifth pair of legs. The legs are normal in position. The antennæ are small, sometimes obsolete. The external maxillipeds completely close the buccal cavern and have the palp completely hidden in repose. The branchiæ are less than nine (six in many forms) in number on either side.

Family III. *Dorippidæ*. The carapace is short, so that the first two or three abdominal terga, instead of being tucked up beneath it, are completely exposed in the dorsal plane of the body. The last two pairs of legs are much reduced in size and have a peculiar position in the dorsal plane of the body. The antennæ are large. The antennules are usually too large to fold into their fossettes. The vasa deferentia emerge through the sternum near the bases of the fifth pair of legs. The afferent branchial openings are found either in front of the bases of the chelipeds or not. The external maxillipeds either do cover the buccal frame (*Tymolinæ*), or do not (*Dorippinæ*). The branchiæ are less than nine in number on either side.

Family IV. *Raninidæ*. Carapace remarkably elongate, but not covering the abdominal terga, the first 4 or 5 of which lie exposed in the dorsal plane of the body. The last pair of legs also is raised in the dorsal plane of the body. The antennæ are large. The antennules also are large, and do not fold into fossettes. The vasa deferentia protrude through the bases of the fifth pair of legs: the oviducts pierce the bases

of the third pair of legs. The sternum is broad anteriorly, very narrow or linear posteriorly. The afferent branchial openings are not found in front of the bases of the chelipeds, and afferent currents probably reach the branchial chamber between the posterior border of the carapace and the bases of the last pair of legs. The external maxillipeds completely cover the buccal cavern, and their palp is concealed in repose: their exopodite is but little longer than the ischium. The branchiæ are less than nine in number on either side.

### Family CALAPPIDÆ.

*Calappiens*, Milne-Edwards, Hist. Nat. Crust. II. 100.

*Calappidea* and *Matutoidea*, De Haan, Faun. Japon. Crust. pp. 124, 126.

*Calappidæ* and *Matutidæ*, Dana, U. S. Expl. Exp., Crust. I. pp. 390, 391.

*Calappidæ* and *Matutidæ*, Miers, 'Challenger' Brachyura, pp. 282, 293.

Carapace more or less oval or subcircular, commonly with either (1) a single denticle or a heavy spine at the junction of the antero-lateral and postero-lateral borders, or (2) a postero-lateral vault-like expansion over the ambulatory legs (*Calappa*). Front generally about as wide as the orbit. The antennules generally fold obliquely. The antennæ are generally small.

The external maxillipeds may (*Matutinæ*) or may not (*Calappinæ*) completely close the buccal cavern, and their palp may (*Matutinæ*) or may not (*Calappinæ*) be concealed in repose.

The efferent branchial channels together form a deep channel in the endostome the channel being covered in below by a long lamellar process of the internal (first) maxillipeds. The afferent branchial openings have the normal position in front of the bases of the chelipeds.

The chelipeds are ponderous and greatly enlarged, and are practically symmetrical (except sometimes as to the fingers)\*: the hands especially are of great size—forming often the most conspicuous part of the chelipeds, and are so curved as to shut closely against the pterygostomian regions of the carapace, thus acting as a sort of buckler.

The abdomen usually (always in Indian forms) consists in the adult male of 5 segments, the 3rd–5th terga being fused together, and of 7 separate segments in the female (and young male). The branchiæ in all Indian forms are nine in number on either side.

In the male the vasa deferentia perforate the bases of the fifth pair of legs.

In the following list of genera belonging to the family *Calappidæ*

\* In the exotic genus *Platymen* one cheliped is larger than the other.

those belonging to the Indian fauna are printed in Roman type, and those known to me by autopsy are marked with an asterisk.

### Family **Calappidæ.**

#### Subfamily I. *Calappinæ.*

##### Alliance I. CALAPPOIDA.

##### \* *Calappa.*

*Paracyclois*, Miers, 'Challenger' Brachyura, p. 288, pl. xxiv. figs. 1, 1a-1c.

\* *Platymera*, Milne-Edwards, Hist. Nat. Crust. II. 107; and Milne-Edwards and Lucas, Voy. Amer. Merid. Crust. pl. xiii.

##### \* *Mursia.*

*Acanthocarpus*, Stimpson, Bull. Mus. Comp. Zool. II. 1870-71, p. 152; and A. Milne-Edwards, Bull. Mus. Comp. Zool. VIII. 1880-81, pl. i.

##### \* *Cryptosoma.*

##### Alliance II. ORITHYIOIDA.

*Orithyia*, Fabr., Milne-Edwards, Hist. Nat. Crust. II. 110, and in Cuvier, Règne Animal, Crust., pl. viii. figs. 1, 1a-1c.

#### Subfamily II. *Matutinæ.*

##### Alliance I. MATUTOIDA.

##### \* *Matuta.*

##### Alliance II. HEPATOIDA.

*Osachila*, Stimpson, Bull. Mus. Comp. Zool., II. 1870-71, p. 154; and Faxou, 'Albatross' Stalk-eyed Crustacea, pl. v. figs. 2, 2a, 2b.

\* *Hepatus*, Latr., Milne-Edwards, Hist. Nat. Crust. II. 116, and in Cuvier Règne Animal, Crust. pl. xiii. figs. 2, 2a-i.

#### Subfamily CALAPPINÆ.

*Calappidæ*, Dana loc. cit., and Miers loc. cit.

Merus of external maxillipeds not elongate and acute (except in the exotic and somewhat aberrant genus *Orithyia*), and never concealing the palp in repose. Legs gressorial (except in the exotic genus *Orithyia*.)

## Subfamily MATUTINÆ.

*Matutidæ*, Dana, *loc. cit.*, and Miers, *loc. cit.*

Merus of external maxillipeds elongate and acute, entirely concealing the palp in repose. Legs natatorial.

### *Key to the Indian genera of Calappidæ.*

I. *Calappinæ*:—Merus of external maxillipeds not elongate or acute, and never concealing the flagellum in repose: ambulatory legs gressorial:—

1. Carapace with a postero-lateral shield-like expansion or series of broad serrations, forming a vault beneath which the four ambulatory legs can be completely or largely concealed in flexion: basal joint of antennæ much dilated ... .. CALAPPA.

2. Carapace without any trace of a postero-lateral shield-like expansion: basal joint of antennæ slender:—

i. Carapace transversely oval, with a large spine at the junction of the antero-lateral and postero-lateral borders ... .. MURSIA.

ii. Carapace sub-circular or longitudinally suboval, with a small denticle at the junction of the antero-lateral and postero-lateral borders ... .. CRYPTOSOMA.

II. *Matutinæ*:—Merus of external maxillipeds elongate and acute, and completely concealing the flagellum in repose: ambulatory legs in the form of swimming paddles. (Carapace sub-circular, with a large spine at the junction of the antero-lateral and postero-lateral borders: antennæ rudimentary) ... .. MATUTA.

CALAPPA, Fabricius, Edw.

*Calappa*, Fabricius, Ent. Syst., Suppl. p. 345.

*Calappa*, Milne-Edwards, Hist. Nat. Crust. II. 102.

*Calappa*, Lophos, Camara, Gallus, De Haan, Fauna Japonica, Crust. pp. 69, 70, 125.

*Calappa*, Miers, 'Challenger' Brachyura, p. 283.

Carapace strongly convex, rounded in front, much broadened behind by a pair of clypeiform expansions, or wings, beneath which the four pairs of ambulatory legs are concealed in flexion.

Front small, somewhat triangular, projecting little or not at all beyond the level of the orbits, bilobed.

Orbits small, circular: eyestalks short and thick.

The antennules fold nearly vertically beneath the front.

The basal joint of the antennæ is very broad, and fills a wide hiatus at the inner angle of the orbit: the flagellum is short usually.

There is no distinct epistome; but the endostome is prolonged, as far as the antennulary fossæ, in the form of a canal, which is divided longitudinally by a deep vertical septum into two channels, each channel being completed below by a lamellar process from the first pair of maxillipeds.

The external maxillipeds do not meet across the mouth, but leave exposed between them the mandibles, and, in front of them, the aforementioned plate-like prolongations from the first pair of maxillipeds.

The chelipeds are very large, and in flexion are closely apposed to the front half of the carapace, so as to form a sort of buckler: the meropodite, or "arm," has near its distal end, externally, a transverse wing-like expansion, complementary to the wing-like expansions of the carapace: the propodite, or "hand," is strongly compressed, its upper border forming a high, sharply dentate or crenulate, crest. Except for the fingers, the chelipeds are equal and symmetrical; both the fingers, namely, of one hand have on their outer aspect, near the base, a stout projecting lobule.

The abdomen in the adult male\* consists of only five separate pieces, owing to the fusion of the 3rd, 4th and 5th somites. In the young male, as in the adult female, it consists of seven separate somites.

### *Key to the Indian species of Calappa.*

- I. Extreme length of the carapace either quite or nearly equal to its extreme breadth:—
  1. Carapace as long as broad: clypeiform expansions ill developed:—
    - i. Carapace sub-circular, with 7 longitudinal parallel lines of bullous tubercles ... *C. pustulosa*.
    - ii. Carapace sub-quadrangular, without regular lines of tubercles ... *C. wood-masoni*.
  2. Carapace a little broader than long: clypeiform expansions well-developed ... *C. gallus*.

\* ? *C. gallus*, of which species I have not seen adult males.

- II. Extreme length of the carapace about two-thirds of its extreme breadth: free margin of clypeiform expansions strongly laciniate:—
1. Carapace, in the adult, nearly smooth: clypeiform expansions well-developed.  
[*Inhabitants of shallow water*]:—
    - i. Anterior border of endostomial septum deeply concave: no spine in the middle line, on the posterior border ... .. *C. lophos.*
    - ii. Anterior border of endostomial septum strongly convex: a spine in the middle line, on the posterior border ... .. *C. philargius.*
  2. Carapace, in the adult, more or less covered with pustular tubercles: clypeiform expansions little developed.  
[*Habitat deep water*] ... .. *C. exanthematosa.*
- III. Extreme length of the carapace very much less than two-thirds of its extreme breadth: free margin of clypeiform expansions either smooth throughout, or broadly dentate:—
1. Extreme length of carapace rather more than half its extreme breadth: surface of carapace with numerous sharpish tubercles: antero-lateral border of clypeiform expansions with broad teeth the points of which are either acute or have the form of up-curved spines:—
    - i. Antero-lateral border of carapace coarsely serrate ... .. *C. hepatica.*
    - ii. Antero-lateral border of carapace, and of clypeiform expansions, with strongly up-curved spines ... .. *C. spinosissima.*
  2. Extreme length of carapace rather less than half its extreme breadth: surface of carapace with wavy beaded lines only: free edge of clypeiform expansions smoothly moulded and entire ... .. *C. fornicata.*

1. *Calappa fornicata*, Fabr.

*Cancer calappoides*, Rumph, Amboinsche Rariteitkamer I. 21, pl. xi. figs. 2, 3.

*Cancer heracleoticus*, Seba, Thesaurus III. 51, pl. xx. figs. 7, 8.

*Cancer calappa*, Linn., Mus. Lud. Ulr. p. 449, and Syst. Nat., 12th ed. I. ii. 1048; Herbst, Krabben I. ii. 196, pl. xii. figs. 73, 74; Fabricius, Ent. Syst. II. 454.

*Calappa fornicata*, Fabricius, Ent. Syst. Suppl. p. 345; Bosc, Hist. Nat. Crust. I. 183 (nec pl. iii. fig. 3); Latreille, Hist. Nat. Crust. et. Ins. V. 394; Desmarest, Consid. Gen. Crust. p. 109; MILNE-EDWARDS, Hist. Nat. Crust., II. 106; Dana, U. S. Expl. Exped., Crust. pt. I. p. 394, pl. xxv. fig. 1; A. Milne-Edwards, Nouv. Archiv. du Mus. IV. 1868, p. 72, and X. 1874, p. 56; Hilgendorf in Von Der Decken's Reisen in Ost.-Afr. III. i. p. 92; Brito Capello, Jorn. Sci. Lisboa, III. 1870-71, p. 133, pl. ii. fig. 5; E. Nauck, Zeits. Wiss. Zool. xxxiv. 1880, p. 46 (gastric teeth); A. Ortmann, Zool. Jahrbucher, Syst. etc. VI. 1892, p. 569.

Carapace in length less than half the extreme breadth; its surface nearly smooth anteriorly, marked with transverse wavy beaded lines posteriorly; its antero-lateral borders crenulated.

Clypeiform expansions very large, their breadth (transverse measurement) equal to their length (oblique antero-posterior measurement); their edge smoothly moulded, and in unbroken continuity with the smoothly moulded posterior border of the carapace. Outer part of the pterygostomian regions densely hairy.

Front slightly projecting beyond the level of the orbits, bilobed, its breadth at the tip rather less than the breadth of the orbit.

Endostomial septum extending vertically from the level of the front to the level of the mouth; its anterior border strongly convex and projecting.

Transverse wing-like expansion near the distal end of the arm with its edge smooth and entire.

Outer surface of palm with squamiform tubercles and transverse wavy beaded ridges: upper margin, or crest, of palm bluntly dentate.

Three specimens, including a male and ovigerous female of remarkable size, are in the Museum collection, from the Andamans.

The eggs are singularly minute.

2. *Calappa hepatica* (Linn.)

*Cancer hepaticus*, Linn., Mus. Lud. Ulr., p. 448, and Syst. Nat. ed. xii. I. ii. 1048.

*Calappa hepatica*, De Haan, Faun. Japon. Crust., p. 70; Miers, Cat. Crust. New Zealand, p. 55, and Phil. Trans. Roy Soc. Vol. 168, 1879, p. 491, and Zoology H. M. S. 'Alert' pp. 185, 257, 518, 550, and 'Challenger' Brachyura, p. 285; Haswell, Cat. Austral. Crust., p. 136; Filhol, Crust. Nouvelle Zélande, p. 406; [Cano, Boll. Soc. Nat. Napoli, III. 1889, p. 249]; A. Ortmann, Zool. Jahrbuch., Syst. etc., VI. 1892, p. 568; J. R. Henderson, Trans. Linn. Soc., Zool. (2) V. 1893, p. 395.

*Cancer tuberculatus*, Herbst, Krabben, I. ii. 204, pl. xiii. fig. 78; Fabricius, Ent. Syst. II. 454.

*Calappa tuberculata*, Fabricius, Ent. Syst., Suppl., p. 345 : Bosc, Hist. Nat. Crust. I. 183 : Latreille, Hist. Nat. Crust. et. Ins., V. 393 : Desmarest, Consid. Gen. Crust., p. 109, pl. 10, fig. 1 : MILNE-EDWARDS, Hist. Nat. Crust., II. 106 : Owen, Zool. Beechey's Voy. "Blossom," Crust. p. 80 : Krauss, Südafr. Crust., p. 52 : Dana, U. S. Expl. Exp., Crust. pt. I. p. 393 : Stimpson, Proc. Ac. Nat. Sci. Philad., 1858, p. 162 : Heller, Crust. Roth. Meer. in SB. Ak. Wien, 1861, XLIII. p. 372, and 'Novara' Crust. p. 69 : Hess, Archiv. fur Naturges. XXXI. 1865, pp. 157 and 172 : E. Martens, Verh. zool.-bot. Ges. Wien, XVI. 1866, p. 381 : A. Milne-Edwards, Nouv. Archiv. du Mus. IV. 1868, p. 72, and X. 1874, p. 55 : Hilgendorf in Von Der Decken's Reisen in Ost.-Afr. III. i. 92 : Brito Capello, Jorn. Sci. Nat. Lisboa, III. 1870-71, p. 133, pl. ii. fig. 8 : Hoffman in Pollen and Van Dam, Faun. Madagasc. V. 2. 1874, Crustacea, p. 25 (part), pl. vi. figs. 39, 41, 42 : Brocchi, Ann. Sci. Nat. (6) II. 1875, Art. 2, p. 101, pl. xviii. figs. 160, 161, (*male appendages*) : Kossmann, Reise Roth. Meer., Crust., p. 63 : Streets, Bull. U. S. Nat. Mus. VII. 1877, p. 116 : Hilgendorf, MB. Ak. Berl. 1878, p. 809 : Richters, in Möbius, Meeresf. Maurit. p. 157 : de Man, Notes Leyden Mus. II. 1880, p. 184, and Archiv. fur Naturges. LIII. i. 1887, p. 388 : E. Nauck, Zeits. Wiss. Zool. XXXIV. 1880, p. 46 (*gastric teeth*) : Lenz and Richters, Abh. Senck. Ges. XII. 1881, p. 425 : Muller, Verh. Ges. Basel VIII. 1886, p. 473.

*Calappa tuberculosa*, Guérin Méneville, Icon. R. A., Crust. pl. 12, figs. 2, 2a, 2b.

*Calappa sandwichien* (*Calappa tuberculata* var.) Eydoux and Souleyet Voy. 'Bonite,' Vol. I., Zool., p. 245, pl. iii, figs. 9, 10.

Length of carapace a little more than half the extreme breadth. In the anterior two-thirds the surface of the carapace is tuberculate and granular, in the posterior third it is marked with squamiform tubercles and beaded ridges : the antero-lateral borders are coarsely dentate or serrate.

Clypeiform expansions greatly developed, their breadth being equal to their length : their anterior border shows the points of four teeth, but the postero-lateral border forms a continuous curve, broken only on the under surface by three or four faint sutures.

Posterior border of the carapace beaded, unarmed.

Outer part of the pterygostomian regions densely hairy.

Front emarginate, not projecting beyond the level of the orbits, its breadth at the tip markedly less than the breadth of the orbit.

The endostomial septum extends vertically from the level of the front to the level of the mouth ; its anterior border strongly convex and projecting.

Transverse wing-like expansion of the distal end of the arm with its edge four-lobed. Outer surface of palm with numerous sharp tubercles : upper surface of wrist tuberculate : anterior end of arm with some sharp granules : crest of palm crenulate, not sharply dentate.

Andamans, Nicobars, Maldives, Laccadives, Persian Gulf.

In the very young, the extreme length of the carapace is not much



less than three-fourths of the extreme breadth, owing not only to less development of the clypeiform expansions, but to the relative less breadth of the body.

### 3. *Calappa spinosissima*, Edw.

*Calappa spinosissima*, Milne Edwards, Hist. Nat. Crust. II. 106: A. Milne Edwards, Nonv. Archiv. du Mus. X. 1874, p. 55: Richters, in Möbius Meeresf. Maurit., p. 157.

*Calappa tuberculata* (part) Hoffmann in Pollen and Van Dam, Faun. Madagasc. V. ii. Crustacea, p. 25, pl. vi. figs. 40, 43, 44.

Differs from *C. hepatica* only in the following characters:—

(1) the serrations on the antero-lateral border of the carapace, as also the teeth on the antero-lateral border of the clypeiform expansions, are in the form of sharp up-curved spines:

(2) the postero-lateral border of either clypeiform expansion has three spines where, in *C. hepatica*, there are only sutures on the under surface:

(3) some of the tubercles on the outer surface of the palm have sharp spinous points.

From a single small specimen, which is all that the Indian Museum at present possesses, it is impossible to express any opinion as to whether this species is, as Hoffmann appears to have regarded it, a variety of *C. hepatica*, or not.

### 4. *Calappa lophos*, (Herbst).

*Cancer lophos*, Herbst, Krabben, I. ii. 201, pl. xiii. fig. 77.

*Calappa lophos*, Fabricius, Ent. Syst. Suppl., p. 346: Bosc, Hist. Nat. Crust. I. 184: Latreille, Hist. Nat. Crust. et Ins. V. 394: Milne Edwards, Hist. Nat. Crust. II. 104: De Haan, Faun. Japon. Crust. p. 72, pl. xx. fig. 1: Heller, 'Novara' Crust. p. 69: Miers, Ann. Mag. Nat. Hist. (5) V. 1880, p. 315, and 'Challenger' Brachyura, p. 286: E. Nauck, Zeits. Wiss. Zool. XXXIV. 1880, p. 46, (*gastric teeth*): de Man, Archiv. fur Naturges. LIII. 1887, i. p. 339: J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 395.

? *Calappa guerini*, Brito-Capello, Jorn. Sci. Nat. Lisb. III. 1870-71, pp. 128, 133 pl. ii. fig. 2.

The length of the carapace is not quite two-thirds the extreme breadth.

Carapace smooth, except for a few lumps anteriorly and a few scattered granules posteriorly: its antero-lateral borders beaded and finely festooned: its posterior border beaded, and bounded on either side by a tooth.

Clypeiform expansions nearly as broad (transverse measurement) as long (oblique antero posterior measurement), and formed of about 6 large lacinated teeth.

Outer part of the pterygostomian regions densely hairy.

Front bilid, its least breadth equal to the breadth of the orbit, beyond the level of which it does not project.

Endostomial septum extending, posteriorly, from the level of the front to the level of the mouth, but deeply excised anteriorly.

Margin of the transverse wing-like expansion of the distal end of the arm four-lobed, the two anterior lobes each with a spine: upper surface of wrist and outer surface of palm nearly smooth: crest of palm deeply 6- or 7-toothed.

Andamans; the whole of the east coast of India, from the Ganges Delta to Pondicherry; Ceylon, Persian Gulf.

In the *young* the carapace is traversed longitudinally in its anterior three-fourths, by 7 or 8 lines of sharpish tubercles, and is marked in its posterior third by a pair of large ocelli, one in each epibranchial region.

From an examination of a very large series of these young I feel nearly sure that Capello's *C. guerini* is to be referred to this species.

##### 5. *Calappa philargius* (L.)

*Cancer philargius*, Linn. Mus. Lud. Ulr. p. 432, and Syst. Nat. ed. xii. I. ii. 1042: Herbst, Krabben, I. ii. 203.

*Cancer inconspicuous*, Herbst, Krabben, II. ii. 162, pl. xl. fig. 3.

*Calappa cristata*, Fabricius, Ent. Syst. Suppl. p. 346: Latreille, Hist. Nat. Crust. et Ins. V. 393: MILNE-EDWARDS, Hist. Nat. Crust. II. 105, pl. xx. figs. 1, 2: Stimpson, Proc. Ac. Nat. Sci. Philad., 1858, p. 62: Ortmann, Zool. Jahrb., Syst. etc., VI., 1892, p. 565.

*Calappa inconspicua*, Bosc. Hist. Nat. Crust. I. 185.

*Calappa philargius*, De Haan, Faun. Japon. Crust. p. 71, pl. xix fig. 1: E. Nauck, Zeits. Wiss. Zool., XXXIV. 1880, p. 46 (*gastric teeth*): de Man, Archiv. fur Naturges., LIII. 1887, i. p. 388, and Journ. Linn. Soc., Zool., Vol. XXII. 1888, p. 196: J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 396.

The extreme length of the carapace is two-thirds the extreme breadth.

Differs from *C. lophos* only in the following characters:—

(1) there is a large tooth in the middle of the posterior border, and the tooth bounding that border on either side is more salient:

(2) the endostomial septum, instead of being deeply excised anteriorly, has its anterior border strongly convex and projecting.

Mergui, Andamans, Ceylon, Persian Gulf.

In the *young* the teeth of the posterior and postero-lateral borders are more prominent and less oblique; and the carapace is traversed fore and aft by 7 or 8 rows of sharp tubercles.

6. *Calappa exanthematos*, Alcock and Anderson.

*Calappa exanthematos*, Alcock and Anderson, Journal Asiatic Soc. Bengal, Vol. LXIII. pt. 2, 1894, p. 177, and Illustrations of the Zoology of the R. I. M. S. 'Investigator,' Crustacea, pl. xv. figs., 1, 1a.

Extreme length of carapace a little more than two-thirds the extreme breadth.

The carapace is greatly inflated, especially in the branchial regions : its surface in rather more than its anterior half is covered with large round, or oval, smooth mamillary tubercles having a red base and a shining yellow apex, and exactly resembling smallpox pustules ; and is covered posteriorly with smaller round, or oval, slightly elevated patches, which exactly resemble smallpox papules. The antero-lateral borders of the carapace are quite smooth in their anterior half, and have 4 or 5 coarse serrations in their posterior half : the posterior border is beaded, and is bounded on either side by a tooth.

The clypeiform expansions are little developed, their extreme transverse dimension being less than one-third their extreme dimension in an inwardly oblique antero-posterior direction : they consist of about seven serrated teeth.

The pterygostomial regions have only a few scanty hairs.

The front is bifid, the breadth of its tip is half again that of the orbit, beyond which it does not project.

The flagellum of the antenna is nearly twice the breadth of the orbit in length.

The endostomial septum is narrow, not extending vertically to the level of the mouth, and quite plainly shows its origin out of a fold of the endostome : its anterior border is cut straight, and projects obliquely.

The wing-like expansion at the end of the arm has its edge finely serrate and 4-dentate. The upper surface of the wrist and the outer surface of the palm are more or less covered with pustules similar to those on the carapace. The palm has its crest sharply 6- or 7-dentate and its lower surface uniformly covered with beadlike granules.

The sterna corresponding to the 2nd, 3rd and 4th pairs of legs are much inflated.

Bay of Bengal, off the Madras coast, 91-112 fms,

In the *young* the tubercles on the carapace are sharper, and extend further backwards.

7. *Calappa gallus*, (Herbst.)

*Cancer gallus*, Herbst, Krabben, III. iii. 46, pl. lviii. fig. 1.

*Calappa gallus*, Milne Edwards, Hist. Nat. Crust. II. 105 : De Haan, Faun.

Japon. Crust. p. 70 : Dana, U. S. Expl. Exp. Crust. pt. I. p. 393 : A. Milne Edwards in Maillard's l'île Réunion, Annexe F. p. 10, and Nouv. Archiv. du Mus. X. 1874, p. 55 : Brito Capello, Journ. Sci. Nat. Lisb. III. 1870-71, p. 133, pl. ii. fig. 4 : F. Müller, Verh. Ges. Basel, VIII. 1886, p. 473 : Miers, 'Challenger' Brachyura, p. 286 : Ozorio, Journ. Sci. Nat. Lisb., XI. 1885-87, p. 227 : de Man, Arch. für Naturges., LIII. 1887, i. p. 383, and Journ. Linn. Soc., Zool. XXII. 1888, p. 197 : Ortmann, Zool. Jahrbuch., Syst., &c., VI. 1892, p. 567 : J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 395.

The extreme length of the carapace is nearly five-sixths the extreme breadth.

The carapace, the outer surface of the wing-like expansion of the arm, the upper surface of the wrist, and the outer surface of the palm, are covered with coarse tubercles, which become squamiform on the posterior part of the carapace.

The antero-lateral border of the carapace is crenulate, and the posterior border is finely beaded and quite unarmed.

The clypeiform expansions are well developed, their extreme transverse dimension being about two-thirds their extreme antero-posterior dimension: the free edge of each has about six strong teeth with beaded edges.

The pterygostomial regions have only a few scanty hairs.

The front is emarginate, and projects well beyond the orbits, forming a laminar rostrum.

The endostomial septum extends vertically from the level of the front to the level of the mouth: its anterior border is angularly convex.

The wing-like expansion of the end of the arm is conspicuously four-lobed: the crest of the palm is 6- or 7-dentate.

Mergui, Andamans, Ceylon, Persian Gulf.

In the *young* the tubercles of the carapace and chelipeds are sharper and crisper, and the antero-lateral borders of the carapace are sharply serrate.

### 8. *Calappa pustulosa*, n. sp. Plate VI. fig. 1.

Carapace subcircular, the clypeiform expansions consisting of five short broad teeth, the last of which is in advance of the level of the posterior border: its surface is covered with large bullous tubercles arranged in seven parallel longitudinal rows: the antero-lateral borders are smooth in their anterior half, crenulated in their posterior half: the posterior border is bounded on either side by a faint prominence.

The pterygostomial regions have a few scanty hairs.

The front is sharply bilobed, its tip is not quite so broad as the orbit, beyond the level of which it projects.

The endostomial septum does not extend vertically from the level of the front to the level of the mouth, except at its posterior limit.

The crest at the distal end of the arm is four-lobed: the upper surface of the wrist and the outer surface of the palm have numerous bullous tubercles like those on the carapace: the crest of the palm is serrate.

The abdomen is as in *C. lophos*.

The sterna corresponding to the 2nd, 3rd and 4th legs are inflated.

Off Ganjam and Orissa Coasts, 25 fathoms.

9. *Calappa wood-masoni*, n. sp. Plate VI. fig. 2.

Very closely allied to *C. depressa*, Miers, 'Challenger' Brachyura, p. 287, pl. xxiii fig. 2.

The extreme length of the carapace is a little greater than the extreme breadth.

Carapace depressed; its surface crisply tuberculate, except between the eyes, the tubercles becoming squamiform posteriorly: the antero-lateral borders crisply crenulate, the posterior border entire and unarmed.

The clypeiform expansions are slightly developed, and plainly consist of about 7 convex carinate teeth fused together except at the tip.

Pterygostomial region with few scanty hairs.

Rostrum sharply and deeply bilobed, each lobe being again subdivided at tip; projecting well beyond the level of the orbits, and rather broader than them.

Flagellum of antenna nearly half the length of the carapace.

Endostomial septum extending vertically from the level of the front to the level of the mouth; its free edge greatly thickened, its anterior edge sharply excised.

Crest at the distal end of the arm broadly and faintly four-partite: upper surface of wrist and outer surface of palm crisply tuberculate: crest of palm sharply serrate.

Penultimate segment of the male abdomen the shortest of all except the first.

Off south coast of Ceylon, 34 fathoms.

The above description applies to the *young*, no adults having been obtained.

MURSIA, Desmarest, Edw.

*Mursia*, Desmarest, Consid. Gen. Crust., p. 108, pl. 9, fig. 3.

*Mursia*, [Latreille, in Cuvier, Règne Animal, ed. 2, p. 39] and Milne-Edwards in Cuvier, Règne Animal, ed. 3, p. 54.

*Mursia*, Milne-Edwards, Hist. Nat. Crust. II. 109.

*Mursia*, De Haan, Faun. Japon. Crust. p. 68 and p. 125.

*Mursia*, Miers, Challenger Brachyura, p. 290, (*ubi* *synon.*).

*Thealia*, Lucas, Ann. Soc. Entomol. France (1) VIII. 1839, p. 577.

Carapace oval, moderately convex, rounded in front, rather suddenly contracted behind, the evenly-arched antero-lateral margins ending in a large lateral epibranchial spine.

Front with a small acuminate tip.

Orbits rather large, oval, with at least one closed but distinct fissure in the upper margin, and with two wide gaps in the lower margin, in one of which the basal joint of the antenna is lodged. Eyes large, eyestalks short and thick.

The antennules fold obliquely. The basal joint of the antennæ is not dilated.

There is no distinct epistome, but, as in *Calappa*, the endostome is prolonged into a canal, which however is but incompletely divided longitudinally, the septum being little more than a ridge anteriorly, though well developed posteriorly. As in *Calappa* the first pair of maxillipeds give off each a lamellar process to complete this efferent canal below.

The external maxillipeds do not meet across the mouth, but, as in *Calappa*, leave exposed between them the mandibles, and, in front, the plate like prolongations of the first maxillipeds.

The chelipeds are enlarged, much as in *Calappa*; but the meropodite, or "arm," instead of a transverse crest near the distal end of its outer surface, has merely a ridge with one or two spines: the palm is compressed and its upper border forms a dentate crest, but not such a high one as that of *Calappa*. As in *Calappa* the chelipeds are only asymmetrical as regards the fingers, which on one hand have on their outer aspect, near the base, a stout lobule.\* The legs are large, the first two pairs being at least as long as the chelipeds.

The abdomen in the male is as broad in the proximal half as it is in the female: in the adult male it consists of five segments, the 3rd, 4th and 5th being intimately fused, the sutures even being hardly distinguishable: in both sexes the tergum of the 1st somite is almost entirely concealed, and that of the 2nd somite strongly carinate transversely.

*Mursia* is practically *Calappa* without the wings to the carapace, and with large strong legs: the widely fissured orbital floor, the less

\* In *Mursia hawaiiensis*, Mary J. Rathbun, Proc. United States National Museum, xvi. 1893, p. 252, the chelipeds are described as very unequal.

pronounced endostomial septum, and the slender basal-antennary joint are the other important points of difference.

10. *Mursia bicristimana*, Alcock and Anderson.

*Mursia bicristimana*, Alcock and Anderson, Journ. Asiatic Soc. Bengal, Vol. LXIII. 1894, pt. 2, p. 179; and Ill. Zool. 'Investigator' Crust. pl. xxiv. fig. 5 (in the press).

The length of the carapace is about seven-ninths of the breadth immediately in front of the lateral epibranchial spine; and the length of the epibranchial spine is from one-third (in the young) to less than one-fourth (in the adult) the length of the carapace.

The surface of the carapace is closely granular, and in addition there are *seven rows of tubercles*, one in the middle line, and three on each side radiating over the branchial regions: the antero-lateral margins are finely beaded and evenly and sharply festooned: the postero-lateral margins are without the angular bend inwards seen in *M. armata*: *the posterior margin is bounded on either side by a laminar denticle, not by a great projecting lobule as in M. armata.*

The outer parts of the pterygostomial and subhepatic regions are covered with a dense felt of long hairs.

The rostrum is trilobed, its breadth at the level of the lobes being about one half more than the greatest breadth of the orbit.

The transverse ridge near the distal end of the arm is very hairy, and is armed distally with two spines, the outer and larger of which is more than half the length of the lateral epibranchial spine. *This ridge is continued along the palm as a sharp longitudinal crest* (more prominent even than that of *Platymera*) which is unevenly trilobed, the proximal lobe being spiniform, the middle lobe broad and obtuse, and the distal lobe narrow and obtuse. The upper surface of the wrist, and the outer surface of the palm and fingers, are closely and sharply granular: the upper edge, or crest, of the palm is 7- serrate.

The ambulatory legs are large stout and compressed, those of the first three pairs being a little longer than the chelipeds. In these three pairs the *meropodite is lamellar, its greatest breadth being considerably more than a third its length*; the carpus has its outer surface traversed longitudinally by three beaded carinæ, the middle one of which ends in a spine; and the propodite is lamellar with the outer (anterior) edge subcarinate and the upper surface traversed longitudinally by two or three raised lines of fine beading.

The second abdominal tergum in both sexes is raised into a stout carina, the height of which is more than a third the transverse diameter of the tergum: this carina is three lobed, the lobes being separated only

by fissures. In the female, as in the male, the 3rd-5th terga are fused, although the lines of fusion are quite distinct in the former sex.

Colours in life salmon pink.

Off Ceylon, 142-400 fms., and 180-217 fms.

In the form of the legs, in the ornamentation of the chelipeds, and in the shape of the carapace, this species bears a strong resemblance to *Platymera*. Even in the articulation of the flagellum with the merus of the external maxillipeds the appearances are somewhat those of *Platymera*.

On the other hand the form of the endostomial channels, and of the processes of the first maxillipeds which close those channels ventrally, as well as the practical symmetry of the chelipeds, are all as in *Mursia*.

But a comparison of this species with specimens of *Mursia armata* and *Platymera gaudichaudii* leads to the belief that all three are congeneric.

The dimensions of an adult male are as follows :—

breadth of carapace 67 millim., excluding the lateral epibranchial spines ;  
length of carapace 47 millim.

length of first pair of ambulatory legs about 90 millim.

#### CRYPTOSOMA, Brullé.

*Cryptosoma*, Brullé in Webb and Berthelot's Hist. Nat. des îles Canaries, Crustacés, p. 16.

*Cryptosoma*, Milne-Edwards, Hist. Nat. Crust., II. 110.

*Cryptosoma*, Miers, Challenger 'Brachyura,' p. 292.

*Cycloes*, De Haan, Faun. Japon. Crust., p. 68, and p. 125.

Carapace heart-shaped or subcircular.

Front rather narrow, and often emarginate.

Orbits, as in *Mursia*, large, oval, with a distinct suture or a fissure in the roof, and with two gaps in the floor, in one of which the slender basal-antennary joint is lodged. Eyes large, eyestalks short and thick.

The antennules fold obliquely.

The external maxillipeds meet sufficiently to conceal all the underlying (i.e., really overlying) parts, and to completely close the buccal frame as far as the front. Concealed by the external maxillipeds there is, however, an endostomial efferent branchial channel closed by lamellar processes from the 1st pair of maxillipeds.

The antero-internal angle of the merus of the external maxillipeds is prolonged obliquely forwards to form a prominent lobule above the articulation of the palp.



The chelipeds are as in *Calappa* and *Mursia*: the meropodite, or "arm" has the same transverse ridge or crest near its distal end, externally; the palm is strongly compressed, with its upper border raised into a sharp serrated crest; and the chelipeds as a whole are symmetrical, except that on one hand the fingers have each, at the base, on their outer surface, a coarse tooth or lobule.

The legs are compressed and are of moderate size: none of them approach the chelipeds in length.

The abdomen in both sexes is much as in *Calappa*: in the male the 3rd, 4th and 5th terga are intimately fused together, and with almost complete obliteration of sutures; in the female all seven segments are perfectly distinct. In the majority of species the second abdominal tergum, in both sexes, is strongly carinate transversely, as in *Mursia*.

#### 11. *Cryptosoma granulosum*, (De Haan).

*Cycoes granulosa*, De Haan, Faun. Japon. Crust. p. 71, pl. xix. fig. 3.

*Cryptosoma granulosum*, Miers, 'Challenger' Brachynra, p. 293: Alcock and Anderson, J. A. S. B., Vol. LXIII. 1894, pt. 2, pp. 198 and 203.

Carapace conspicuously longer than broad, its surface, like the exposed surfaces of the chelipeds, finely and very closely granular: in its anterior half there are also some small tubercles, most of which fall into seven nearly longitudinal rows, one row being in the middle line. The antero-lateral borders are very finely crenulate, and end at a tiny lateral-epibranchial denticle. The convergent postero-lateral borders, and the posterior border, are very finely and closely beaded. The outer parts of the pterygostomian and subhepatic regions are covered with a felt of fine short hairs.

The front is bidentate and projects beyond the level of the orbits: the latter occupy all the rest of the anterior border.

The antennary flagella are very short.

The transverse ridge at the distal end of the arm is granular, and is armed with three spines gradually increasing in size from within outwards: the upper surface of the wrist has several small tubercles: the outer surface of the hand has, at its base, an oblique crest, which ends acutely and is continued obliquely upwards as a line of small tubercles; a second line of tubercles runs parallel with this, obliquely across the middle of the hand: the crest of the hand is 8-dentate.

The last pair of legs has its four terminal joints distinctly lamellar.

The carina of the second abdominal tergum is in both sexes trilobed, the middle lobe being much smaller than the lateral lobes.

Andamans, depth not recorded: Maldives, 20-30 fms.

## MATUTA, Fabr., Edw.

*Matuta*, Fabricius, Ent. Syst., Suppl. p. 369.

*Matuta*, Milne-Edwards, Hist. Nat. Crust. II. 113.

*Matuta*, Miers, Trans. Linn. Soc. Zool. (2) I 1875-79 (1877) p. 243, and 'Challenger' Brachyura, p. 294.

*Matuta*, de Man, Notes Leyden Mus. III. 1881, p. 109.

Carapace somewhat depressed, usually subcircular, with the postero-lateral borders sharply convergent, and usually with a great horizontal spike at the lateral epibranchial angle, on either side.

There are usually six more or less distinct tubercles, disposed quite symmetrically, in the middle of the carapace, and there is commonly an eminence, or even an acute tubercle, in the front half of the postero-lateral border.

The front is about as wide as the orbit, and consists of three nearly equal lobes, the middle one of which projects as a laminar rostrum with the end usually bifid or emarginate.

The orbits are large and roughly reniform: in the middle of the upper border are two short sutures, placed close together; at the external angle is a wide gap communicating with a deep groove in the pterygostomian region; while at the internal angle is a fissure communicating with the antennular fossa. The eyestalks are stout but somewhat elongate.

The antennules fold nearly longitudinally. The antennæ are almost rudimentary, and occupy a space between the basal-antennular joint and the lower wall of the orbit.

The external maxillipeds completely cover the mouth and all the mouth-parts, up to the level of the front, the patulous efferent branchial orifice being visible only from above. In repose the palp of the external maxillipeds lies completely concealed within a deep groove in the dorsal face of the long subacute meropodite.

On removal of the external maxillipeds a deep undivided efferent canal is seen in the roof of the endostome, which groove is closed below by an elongate lamellar process of the first pair of maxillipeds.

The chelipeds are shaped on the *Calappa* plan, but are quite singular in having, on the inner face, near the crest of the palm, two raised obliquely-striated areas—one linear, the other broadly oval—which in two species at any rate, and probably in all, are used as stridulating organs. The meropodite, or "arm," has the transverse distal crest low, and only well-pronounced at the outer angle, where there is a prominent lobule. The propodite or "hand" is compressed, but not so much so as in *Calappa*, and has its upper border cristate, and its outer surface definitely sculptured. The fingers, as well as the rest of the chelipeds, are quite symmetrical.

The four ambulatory legs have the form of swimming-paddles, the two terminal joints being broadened and compressed—in the first and last pairs of legs enormously so.

The abdomen in the adult male consists of 5 segments, owing to the intimate fusion of the 3rd, 4th and 5th terga: in the female and young male all 7 terga are distinctly separate. In both sexes the first tergum is almost entirely concealed beneath the carapace.

In the adult male the *third* tergum is very strongly carinate transversely, and the second moderately so. In the female and young male both the *second* and *third* terga are strongly carinate, and if there is any inequality it is the *second* that is most prominent.

Owing partly to their great similarity, and partly to the insufficient descriptions of earlier authors, the discrimination of the species of *Matuta* has always been a matter of difficulty.\*

The first species described and figured is the *Cancer lunaris* of Rumph (Amboinsche Rariteitkamer p. 11, pl. vii., fig. S. 1705), a species characterized by the possession of an entire (i.e., not bifid) rostrum and of a very sharply defined tubercle near the middle of either posterior border.

This species must, I believe, be (1) the species called *M. banksii* by Leach, Miers, and subsequent authors, (2) the *M. picta* of Hess and Miers, (3) the *M. distinguenda* of Hoffmann, and (4) the *M. obtusifrons* of Miers. I think also that the *M. granulosa* of Miers and de Man is only a slightly abnormal form of Rumph's species.

Rumph's name having unfortunately been accepted for a quite different post-Linnæan species, cannot now be used; and Rumph's species must therefore bear the earliest applicable post-Linnæan name—namely *M. banksii*, Leach.

*M. banksii* according to Leach can be recognized by a very strong tubercle behind the lateral spine.

The second known species of *Matuta* is the *Cancer americanus* of Seba (Thesaurus III. 52, pl. xx., figs. 10, 11. 1758), of which it is impossible to say more than that it roughly represents the form of the genus *Matuta*.

Herbst (Krabben, etc., 1790–1799) described and figured two species of *Matuta*. One (Krabben, I. ii. 140, pl. vi. fig. 44), he called *C. lunaris*, and this he says is Rumph's species, quoting Rumph's Latin and vernacular names: the other (I. ii. 143) he called *C. victor* of Fabricius. Subsequently, however (III. ii. 43) he re-named *C. victor* *C. lunaris*, figured it on pl. xlviii. fig. 6, and stated that his *C. victor* and *C. lunaris* are the same species.

Herbst's two figures—pl. vi. fig. 44 and pl. xlviii. fig. 6—are so different, however, that doubts must still remain as to whether they both really do refer to the same species, and it does not seem to me that Hilgendorf's observations, to be presently referred to, clear these doubts up. I believe myself that Herbst's plate vi. fig. 44 might still be regarded, as Herbst at first seems to have regarded it, as representing Rumph's *Cancer lunaris*.

Fabricius who (Entomol. Syst., Suppl. p. 369, 1798) instituted the genus *Matuta*, included in it two species—*M. victor* and *M. planipes*. We know, from Hilgendorf's paper to be presently considered, to what species of modern authors these refer.

\* Unfortunately I have not been able to see Latreille's article on the genus *Matuta* in the *Encyclopédie Méthodique*, Vol. X.

Leach (Zool. Miscellany III. pp. 12-14, 1817), gave brief diagnoses of four species of *Matuta*. One of these—*M. banksii*—I believe to apply to Rumph's *Cancer lunaris*.

A second—*M. hesueurii*—is referred by Miers, and I think with justice, to the *M. victor* of Fabricius.

A third—*M. peronii*—is also, and I think rightly, referred by Miers to *M. victor*, Fabr.

The fourth—*M. lunaris*—is regarded by Miers, whose paper will be considered in the sequel, as applicable to *M. picta* of Hess, a species characterized by having a simple rostrum and a tubercle in the postero-lateral border. Now Leach's figure shows a distinctly bilobed rostrum, and has no tubercle on the postero-lateral border, so that I do not see how the name *M. picta* can apply to it. Leach's *M. lunaris* seems to me rather to agree with the species described by Henderson as *M. miersii*.

To sum up, it seems to me that three species were known to Leach, namely *M. banksii*, Leach, (Rumph's species), *M. victor* Fabr. and perhaps the species now known as *M. miersii*, Henders.

The great naturalist Milne-Edwards only admitted two species of *Matuta*, namely *M. lunaris* and *M. victor*, and it is only because I have been able to examine over 400 specimens from all parts of the Indian coasts, that I venture to disagree from him.

I can reconcile his description of *M. lunaris* with the *M. lunaris* of Leach and with Guérin's figure of *M. peronii* (not Leach's); but on the strength of Hilgendorf's statements I do not see how it can be reconciled with Herbst's *Cancer lunaris*. Milne-Edwards italicizes the fact that the carpus of the penultimate pair of legs is *bicarinatæ*: now the only species known to me that agrees with his description in other respects, and has also the carpus of the penultimate legs full and indistinctly bicarinate, is Henderson's *M. miersii*.

The *M. victor* of Milne-Edwards seems to be Fabricius' species, although I do not think that the whole of the synonymy can be accepted.

Miers' classical attempt (Trans. Linn. Soc. Zool. (2) I. 1875-79 [1877] p. 243) to simplify the confusion existing in this group, although forming a careful critical and extremely valuable paper, yet fails for the reason that the character selected by Miers for the primary subdivision of the genus—namely the sculpture of the hands and fingers—varies not only according to sex (as Miers indeed fully recognized), but also according to age.

In Miers' system the adult males of *M. victor*, Fabr. and of *M. lunaris* Hbst. Hilgendorf, belong to one section of the genus, and the young males to the other section.

One has, of course, to be very careful in deciding that any given small specimen of *Matuta* corresponds with the young of any given large specimen; but when one finds, for example, that a small male individual, taken on the same spot with a large male and female, exactly resembles the adults in all important characters, and differs from the adult male, and agrees with the adult female, just in those very characters where the adult female differs from the adult male; when, therefore, such a young one can be confused with no other known species; and when moreover these agreements and differences are found to have a general correspondence throughout the whole genus; then one can with some confidence assign that young individual to its place.

One of the most constant differences, throughout the genus, between the adult

male on the one hand, and the female and young male on the other hand, is found in the second and third abdominal terga: in all adult males the third abdominal tergum is very strongly carinated transversely, and the second is carinated also, but not nearly so strongly: in all adult females both the second and the third terga are either equally strongly carinate, or, if one is more prominent than the other, it is the second.

The other differences between the sexes are those (emphasized by Miers) that occur in the sculpture of the hand and fingers; and these differences also apply between the adult male and the young male, which Miers does not appear to have taken into consideration.

The nine species separated by Miers can, in my opinion, be reduced to three, namely, *M. banksii* Leach (Rumph's species), *M. victor*, Fabr., and *M. lunaris* Hbst. Hilgendorf.

The next paper to be referred to is that by Hilgendorf (Monatsber. Ak. Berl. 1878 [1879] p. 810), which is a most authoritative contribution, since the writer had been able to examine Fabricius' types of *M. victor* and *M. planipes*, and apparently also Herbst's specimens. Dr. Hilgendorf states definitely (1) that *M. victor* Fabr. is the species carefully described and figured as *M. victrix* by Miers (*loc. cit.*); (2) that the species figured by Herbst on pl. xlviii. fig. 6 is the unequivocally recognizable *M. rubro-lineata* of Miers (*loc. cit.*); and (3) that the *M. planipes* of Fabricius is *M. lunaris* of Herbst. It is most unfortunate that Dr. Hilgendorf does not tell us whether both of Herbst's figures refer to the same species, or not. We now know, without any ambiguity, what Herbst's pl. xlviii. fig. 6 is; but we are still in doubt as to the meaning of pl. vi. fig. 44.

The last reference necessary is to de Man's paper (Notes Leyden Mus. III. 1881, p. 109), on the species of *Matuta* in the Leyden Museum, a paper that embodies the results of an examination of no less than 270 specimens. With most of Dr. de Man's synonymy I entirely agree, although I am unable to follow him in the acceptance of *M. granulosa*, *M. maculata* and *M. picta* as distinct species.

Dr. de Man rightly recognizes the value of the sculpture of the hand and fingers in the discrimination of the species; but, equally with Mr. Miers, he takes no due notice of the fact that this character varies with age, at any rate in the male sex. He considers that the development of the tubercles on the surface and lateral margins of the carapace furnishes a character of only secondary importance, in which opinion I cannot quite agree with him if he includes the tubercle on the postero-lateral border.

It remains only to refer to the opinions of those who, like M. A. Milne-Edwards and Dr. Ortmann, regard all the forms of *Matuta* as varieties of a single species. This view would seem to imply that the characters by which the species are usually recognized are variable,—either indefinitely so, or in response to some local peculiarities of the environment. Of this I can find no evidence.

Certain of the characters that I have used in separating the species in the Indian Museum Collection are, as far as an examination of over 400 specimens goes, perfectly well defined, whether in the young or in the adult, and whether from the same locality or not.

The characters of the first importance in the separation of the species are those emphasized by Milne Edwards, namely (1) the form of the carpus of the penultimate pair of legs—whether full and

"bicarinate," or compressed and unicarinate, and (2) the extent of the raised postero-lateral border—whether stopping short of the great lateral spine, or prolonged into the border of that spine. With regard to the first of these characters, it may be remarked that the distinction drawn is between a distinctly compressed carpus, and a distinctly inflated carpus. With regard to the second, the distinction drawn is between a sharply-raised border that (in any position of the carapace and in any light) can be plainly seen to form a considerable part of the hinder border of the great lateral spine, and a border that stops at the base of the spine or even further behind. The sculpture of the lower part of the outer surface of the hand is also very definite in all the species, and—if age and sex be taken into due consideration—the sculpture of the median ridge of the hand and of the dactylus. The presence or absence of a tubercle on the postero-lateral border is also of importance.

*Key to the species of Matuta.*

- [I. Carapace pentagonal, lateral epibranchial spine rudimentary ... .. *M. inermis*.\*]
- II. Carapace more subcircular than pentagonal, lateral epibranchial spine greatly developed (*Indian species*) :—
  - 1. Front just equal to the orbit in width, rostrum simple or faintly emarginate : a sharply defined acute tubercle near the middle of the posterolateral border *M. banksii*.
  - 2. Front distinctly wider than the orbit, rostrum distinctly bilobed : postero-lateral border with or without an obscurely defined eminence near its middle :—
    - i. Postero-lateral border elevated throughout, forming a considerable part of the hinder border of the great lateral spine, and without any trace of a tubercle or eminence : lower surface of hand very rough in the adults of both sexes ... .. *M. miersii*.

\* *M. inermis*, Miers, Zoology H. M. S. 'Alert,' p. 256, pl. xxvi. fig. C. Known only from the Melanesian part of the Indo-Pacific area.

- ii. Postero-lateral border elevated posteriorly, gradually subsiding at or behind the great lateral spine, and with an obscurely defined eminence: lower surface of hand quite smooth in the adult male, a little rough in the female and young:—

a. A distinct spine at the angle of the hand where it comes in contact with the external angle of the arm: carapace covered with minute red dots ... .. *M. victor*.

b. Only a tubercle at the angle of the hand where it touches the external angle of the arm: carapace covered with spots, rings, and vermicular lines... .. *M. lunaris*.

(*M. planipes*.)

## 12. *Matuta banksii*, Leach.

*Cancer lunaris*, Rumph, Amboinsche Rariteitkamer, I. p. 11, pl. vii. fig. S. (1705).

?? *Cancer lunaris*, Herbst, Krabben I. ii. 140, pl. vi. fig. 4 (*nec* III. i. 43, pl. xlviii. fig. 6).

?? *Matuta victor*, Bosc, Hist. Nat. Crust. I. 225, pl. iv. fig. 3, (*nec* Fabr.)

*Matuta banksii*, Leach, Zool. Miscell III. p. 14. (1817).

*Matuta victor*, Desmarest, Consid. Crust. p. 101, pl. vii. fig. 2 (*nec* Fabr.)

*Matuta victor* var. *quinta et sexta*, De Haan, Faun. Japon. Crust. p. 128.

*Matuta banksii*, Miers, Trans. Linn. Soc. Zool. (2) I. 1875-79 (1876) p. 245, pl. xl. figs. 1, 2, and Ann. Mag. Nat. Hist. (5) V. 1880, p. 315, and 'Challenger' Brachyura, p. 295: de Man, Notes Leyden Mus. III. 1881, p. 115, and Archiv. für Naturgesch. LIII. 1887, i. p. 389, and in Weber's Zool. Ergeb. Niederl. Ost.-Ind. II. 1892, p. 351: A. O. Walker, Journ. Linn. Soc. Zool. XX. 1890, p. 111: Zehntner. Rev. Suisse de Zool. II. 1894, p. 183, pl. viii. fig. 15.

*Matuta picta*, Hess, Arch. für Naturges. XXXI. i. 1865, pp. 158, 172, pl. vi. fig. 13: Miers, Trans. Linn. Soc. Zool. (2) I. 1875-79, (1876) p. 246, pl. xl. figs. 5-7, and 'Challenger' Brachyura, p. 295: E. Nauck, Zeits. Wiss. Zool. XXXIV. 1880, p. 46 (*gastric teeth*): de Man, Notes Leyden Mus. III. 1881, p. 118, and Zool. Jahrbucher, II. 1887, p. 703: Haswell, Cat. Austr. Crust. p. 135.

*Matuta distinguenda*, Hoffmann in Pollen and Van Dam's Fauna Madagasc., Crust. p. 27, pl. vi. figs. 49-52, pl. vii. figs. 53-57 (1874): Lenz and Richters, Abh. Senk. Ges. XII. 1881, p. 425.

*Matuta obtusifrons*, Miers, Trans. Linn. Soc. Zool. (2) I. 1875-79 (1876), p. 247, pl. xl. figs. 8 and 9, and Ann. Mag. Nat. Hist. (5) V. 1880, p. 316.

? *Matuta granulosa*, Miers, Trans. Linn. Soc. Zool. (2) I. 1875-79 (1876) p. 245, pl. xxxix. figs. 8, 9, and 'Challenger' Brachyura, p. 295: de Man, Notes Leyden Mus. III. 1881, p. 114: Haswell, Cat. Austral. Crust. p. 134.

*Matuta victor*, varr. 5 and 6, and ? 4, Ortmann, Zool. Jahrbucher, Syst., &c., VI., 1891-92, pp. 572, 573.

Carapace coarsely granular in the epibranchial, post-gastric and cardiac regions. All six tubercles are almost always very distinct, both in the young and adult.

The antero-lateral borders are crenulate, the last three crenulations forming three large blunt teeth. The posterior and postero-lateral borders form a continuous granular slightly-elevated ridge, which stops at a sharply-defined tubercle, or tooth, situated considerably in rear of the lateral epibranchial spine. The length of this lateral spine (measured along its front border) is always less than one-fourth the breadth of the carapace.

Front just equal in width to the orbit: rostrum either entire, or faintly emarginate.

Hand with the upper border, or crest, trilobed, and the lower border dentate as far as the base of the immobile finger. Below the crest are two obliquely-longitudinal rows of tubercles, the lower somewhat broken and irregular. Below these, the hand is traversed longitudinally, as far as the finger-cleft, by a row of 5 teeth, of which the 2nd (counting from the proximal end) is enlarged and acute, and the 4th is also somewhat enlarged and acute, but less so in the adult male than in the female and young male. The surface of the hand, below the ridge, is roughened, and is traversed—from the angle where the hand touches the arm, to the immobile finger—by a row of molariform tubercles, which is continued to the tip of the immobile finger as a ridge and furrow: the first of these tubercles, at the angle where the hand touches the arm, is enlarged and acute. The dactylus in the female and young male is convex and smooth: in the adult male it is longitudinally traversed by a sharp ridge, which becomes milled at the distal end.

The carpus of the penultimate pair of legs is full and even inflated, and shows more or less distinct traces of a second dorsal longitudinal carina.

Colour in spirit bright yellow, with a fine close discontinuous reticulum of red markings, which give to the whole, when viewed from a distance, a rich chestnut-brown appearance. The legs are also of the



same bright yellow colour, with copious chestnut-brown markings. Under surface light yellow.

In the Indian Seas only at the Andamans and Nicobars.

The branchial cavity in this species is often occupied by a Bopyrid.

I have examined 63 specimens in the Indian Museum collection, comprising 19 adult males, 28 females, and 16 young males.

13. \* *Matuta victor*, Fabr., Hilgendorf.†

*Cancer victor*, Fabricius, Ent. Syst. II. 449 (*vide* Hilgendorf). 1793.

*Matuta victor*, Fabricius, Ent. Syst. Suppl., p. 369 (*vide* Hilgendorf).

*Matuta victor*, Milne Edwards in Cuvier, Règne Animal, Crust. pl. vii. and Hist. Nat. Crust. II. 115.

*Matuta victor*, var. *prima et secunda*, De Haan, Faun. Japon. Crust. p. 127.

*Matuta victor*, Hilgendorf in Von der Decken's Reisen in Ost.-Afr. III. i. Crust. p. 93, pl. iii. fig. 2: Hoffmann in Pollen and Van Dam's Faun. Madagasc., Crust., p. 27, pl. vi. figs. 45-48: HILGENDORF, MB. AK. BERL. 1878, p. 810.

*Matuta victrix*, Miers, Trans. Linn. Soc. Zool. (2) I. 1875-79 (1876) p. 243, pl. xxxix. figs. 1-3, and Ann. Mag. Nat. Hist. (5) V. 1880, p. 315, and Zool. H. M. S. 'Alert' pp. 185, 256, and 'Challenger' Brachyura, p. 295: de Man, Notes Leyden Mus. III. 1881, p. 110, and Archiv für Naturges. LIII. 1887, i. p. 389: Haswell, Cat. Austral. Crust. p. 133: J. R. Henderson, Madras Journ. Lit. Sci. 1886-87, p. 65, and Trans. Linn. Soc. Zool. (2) V. 1893, p. 396: Ortmann, Zool. Jahrbucher, Syst. etc. VI. 1891-92, varr. 1 and 2 pp. 571-572.

*Matuta victrix* var. *crebrepunctata*, Miers, Trans. Linn. Soc. Zool. (2) I. 1875-79 (1876), p. 244, pl. xxxix. fig. 4, and 'Challenger' Brachyura, p. 295: de Man in Weber's Zool. Ergeb. Niederl. Ost.-Ind. II. p. 351.

*Matuta peronii*, Leach (*nec* Guérin), Zool. Miscell. III. p. 13, pl. 127, figs. 1, 2.

*Matuta lesueurii*, Leach, Zool. Miscell. III. p. 14.

*Matuta maculata*, Miers, Trans. Linn. Soc. Zool. (2) I. 1875-79 (1876) p. 246, pl. xl. figs. 3, 4, and 'Challenger' Brachyura, p. 295: de Man, Notes Leyden Mus. III. 1881, p. 116.

Carapace finely granular in the epibranchial, post-gastric and cardiac regions. The two anterior tubercles are obsolescent; the other four are visible, but are not conspicuous in the adult.

The antero-lateral borders are crenulate, two—sometimes three—of the crenulations being somewhat enlarged, but never forming stout teeth. The posterior and postero-lateral borders form a continuous finely-beaded slightly-elevated ridge, which ends on a faintly-marked elevation, situated considerably in rear of the lateral spine. The length of the

\* The specific name *victor* is here regarded as a noun substantive in apposition to *Matuta*, just as in the name *Felis leo*, the masculine noun *leo* is in apposition to the feminine noun *felis*. It seems unnecessary to change the old established name *M. victor* for a name based on the personal claims of the goddess *Matuta*.

† No references are given, except such as appear to be unequivocally applicable to *M. victor* as re-defined by Miers and confirmed by Hilgendorf.

lateral spine is always very much more than one-fourth—often more than one-third—the breadth of the carapace.

The front is wider than the orbit: the rostrum is sharply bilobed.

Hand with the crest trilobed—the proximal lobe broad, the others acute, and with the lower border dentate (female and young male) or bluntly crenulate (adult male) as far as the base of the immobile finger. Below the crest, on the upper aspect of the hand, are two obliquely-longitudinal rows of tubercles, the lower of which is somewhat broken and irregular. Below these the hand is traversed longitudinally by a ridge, which varies according to age and sex: in the adult male it is strongly salient and is continued nearly to the tip of the immobile finger, and has at its proximal end a tubercle followed by a spine: in the female and younger male it becomes nearly obsolete at the base of the immobile finger, and is broken up into five lobes, of which the second (counting from the proximal end) and the fourth are spines—the second being very large. The surface of the hand below this ridge is smooth in the adult male, except for a strongish spine at the angle where the hand touches the arm; but in the female and younger male it is traversed just above the lower border by a raised but broken ridge, which is most distinct on the immobile finger. The dactylus varies also according to sex and age: in the adult male its external surface is traversed from base to tip by a strongly-milled ridge: in the adult female and youngest males there is little trace of ridge, and none of milling: and the ridge and milling gradually appear in the male with growth, often showing on one hand before the other.

The carpus of the penultimate pair of legs is compressed, and is surmounted dorsally by a single carina.

Colours of carapace, in spirit, dull yellowish-brown to dull olive-green, with a multitude of speckles.

Indian coasts—Penang, Tavoy, Arakan, Andamans, Ganges Delta, Máhánaddi Delta, Madras, Ceylon, Malabar coast, Karáchi.

I have examined 41 adult males, 120 females, and 49 young males in the Indian Museum collection.

This grows to a larger size than any other species of *Matuta*.

#### 14. *Matuta lunaris* (Herbst) Hilgendorf.<sup>1</sup>

? *Cancer lunaris*, Herbst, Krabben I, ii. 140, pl. vi. fig. 44, (1790).

*Matuta planipes*, Fabricius, Ent. Syst. Suppl. p. 369 (*vide* Hilgendorf), 1798.

*Matuta lunaris*, Herbst (*nec* Rumph) Krabben, III. i. 43, pl. xlviii. fig. 6 (*vide* Hilgendorf), 1799.

<sup>1</sup> No references are given except such as appear to be unequivocally applicable to the *M. lunaris* of Hilgendorf.

*Matuta appendiculata*, Bosc, Hist. Nat. Crust. I. 225.

*Matuta victor*, var. *tertia* et *quarta*, DeHaan, Faun. Japon. Crust. pp. 127 and 128.

*Matuta lunaris*, Miers, Trans. Linn. Soc. Zool. (2) I. 1875-79 (1876) p. 247, pl. xl. figs. 10-11 (♀ and young ♂), and 'Challenger' Brachyura, p. 295: HILGENDORF MB. AK. BERL. 1878, p. 810: de Man, Notes Leyden Museum, III. 1881, p. 112: Hendersson, Madras Journ. Lit. Sci. 1886-87, p. 66, fig. 6, and Trans. Linn. Soc. Zool. (2) V. 1893, p. 396.

*Matuta rubrolineata*, Miers, Trans. Linn. Soc. Zool. (2) I. 1875-79 (1876), p. 244, pl. xxxix. figs. 5, 6.

*Matuta lineifera*, Miers, op. cit., p. 245, pl. xxxix. fig. 7: Haswell Cat. Austral. Crust. p. 134.

*Matuta circulifera*, Miers, Ann. Mag. Nat. Hist. (5) V. 1880, p. 315, pl. xiv. fig. 5, and Challenger Brachyura, p. 295.

*Matuta laevidactyla*, Miers, Ann. Mag. Nat. Hist. (5) V. 1880, p. 316 (footnote), and 'Challenger' Brachyura, p. 296 (♀ and young ♂).

*Matuta victor*, var. 3, Ortmann, Zool. Jahrbucher, Syst. &c. VI. 1891-92, p. 572.

Except in colour this species resembles *Matuta victor* very closely, differing only in the following characters:—

(1) the carapace is almost smooth, and the tubercles in the adult, but not in the young, are *all* indistinct:

(2) instead of a spine at the angle where the hand comes in contact with the distal lobule of the arm, there is only a tubercle, or a pair of tubercles:

(3) the fourth lobe of the median longitudinal ridge on the outer surface of the hand is not enlarged or acute: so that, in both sexes, and at all ages, there is only one large spine on the outer surface of the hand. Apart from this, exactly the same sexual and growth-differences occur in the hand as in *M. victor*:

(4) the colour of the carapace, in spirit, is bright yellow with vermicular red lines, which usually form spots or incomplete rings on the anterior half of the carapace and narrow longitudinal loops posteriorly.

I have heard this species stridulate.

Indian coasts—Mergui, Andamans, Burma, Sunderbunds and Gangetic Delta, Máhánaddi Delta, Madras, Bombay, Karáchi.

In the Indian Museum collection are 5 adult males, 55 females (many ovigerous), and fifteen young males.

The question of uniting this species with *M. victor*, as a variety, has to be carefully considered. After examining 210 specimens of *M. victor* and 75 of *M. lunaris* I find that the differences between them hold good irrespective of age or sex, and I would therefore regard the two species as perfectly distinct. I acquiesce in the name *M. lunaris* only on the supposition that Hilgendorf's remarks apply to *both* of Herbst's figures. If they do not apply to Herbst's pl. vi. fig. 44, then the Fabrician name *M. planipes* would have the priority.

15. *Matuta miersii*, Henderson.

♂ *Matuta peronii*, Guérin Méneville, Icon. Règne Animal, pl. i. fig. 1 (*nec* Leach).

?? *Matuta lunaris*, Leach, Zool. Miscell. III. p. 13, pl. 127, figs. 3-5.

♂ *Matuta lunaris*, Milne-Edwards, Hist. Nat. Crust. II. 114 (*nec* Rumph, *nec* Herbst).

*Matuta miersii*, Henderson, Madras Journ. Lit. Sci. 1886-87, p. 66, figs. 1-4, and Trans. Linn. Soc. Zool. (2) V. 1893, p. 396.

Carapace granular upon the eminences that support the tubercles, and towards the lateral epibranchial spines. All six tubercles of the carapace almost always distinct, both in the young and adult.

The antero-lateral borders are crenulate, the last three crenulations forming three large blunt teeth. The posterior and postero-lateral borders form a continuous, beaded, strongly-elevated ridge, which runs about half way along the edge of the lateral epibranchial spine and has in its course no trace of a tubercle or eminence. The length of the lateral spine is always, even in the young, less — often much less — than one-fourth the breadth of the carapace.

The front is wider than the orbit: the rostrum is distinctly bilobed.

Hand with the upper-border trilobed,—the lobes being almost always equal and acute, and with the lower border dentate, in both sexes and at all ages, as far as the base of the immobile finger. Below the crest, on the upper aspect of the hand, are two obliquely longitudinal, regular, unbroken rows of close-set teeth. Below these the hand is traversed longitudinally, as far as the finger-cleft, by a row of 5 teeth, the second of which (counting from the proximal end) is enlarged and acute. The surface of the hand below this ridge, as well as the surface of the immobile finger, is roughened, and is traversed longitudinally, at least as far as the middle of the finger, by a row of molariform tubercles, which row is sometimes incompletely double; but none of the tubercles are acute.

The characteristic sculpture of the hand is the same in the young and adult, in both sexes.

The carpus of the penultimate pair of legs is full, not compressed, and shows more or less distinct traces of a second dorsal carina.

Colour of carapace in spirit: olive yellow with red dots which are arranged in broadish vermicular lines and rings.

This is the smallest of all the species of *Matuta*: the largest male in the collection of the Indian Museum has a carapace-breadth of only 29 millim., and the largest ovigerous female a carapace-breadth of only 20 millim., although there is a single female — non-ovigerous — as large as the largest male.

It can be at once distinguished from *M. banksii* — which it most nearly resembles — by the complete absence of a tubercle on the postero-

lateral border; and by this border being elegantly bended, raised in very strong relief, and continued far along the edge of the lateral spine.

In the Indian Seas this species has only been found on the Madras coast.

Although I have frequently dredged it, I have never done so in less than nine fathoms. I have on more than one occasion heard it make a musical noise audible at several yards distance.

As Henderson has remarked, a *Sacculina* is often found parasitic on the male.

In the Museum collection are 14 adult males, 40 females, and 15 young males.

### Family LEUCOSIIDÆ.

*Leucosiens*, Milne-Edwards, Hist. Nat. Crust. II. 118.

*Leucosiden*, De Haan, Faun. Japon. Crust. p. 129.

*Leucosiidæ*, Dana, U. S. Expl. Exp. Crust. pt. I. p. 390.

*Leucosiadæ*, Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 277.

*Leucosiidæ*, Miers, 'Challenger' Brachyura, p. 297.

Carapace circular or oval or polygonal. Eyes and orbits very small: front narrow but many times wider than the orbit. The antennules fold more or less obliquely. The antennæ are small, sometimes obsolete. The external maxillipeds completely close the buccal cavern, except that very commonly there is a crevice in front: their palp or flagellum springs from a groove in their dorsad surface near the inner edge, and is completely concealed when the maxillipeds are in repose: the exognath is broad, sometimes remarkably broad.

The afferent branchial channels occupy the sides of the endostome on either side of the deep median endostomial groove which, as in the *Calappidæ*, serves as an efferent branchial channel. The afferent channels are covered in by the exognaths of the external maxillipeds; the efferent channel is covered in immediately, as in the *Calappidæ*, by a pair of lamellar processes from the first maxillipeds.

The chelipeds are symmetrical and have no remarkable peculiarity of form.

The abdominal terga are very rarely distinctly separate: commonly in both sexes the 3rd-6th are intimately fused with obliteration of sutures, sometimes however the 6th also is independent, and in a few forms the sutures are not obliterated.

The vasa deferentia emerge through the 5th thoracic sternum on either side, near the bases of the 5th legs.

The *Leucosiidæ* are such a natural group, and the various forms of which it is composed show so many intergradations, that any attempt to split it up into "sub-families" must be received with caution.

Among the genera known to me by autopsy, however, two extremes of form are plainly recognizable, and I propose to use these two extremes as the bases of two natural alliances or sub-families.

The first alliance is typified by *Leucosia* and *Philyra*, the second by *Ilia* and *Iphiculus*.

In *Leucosia* and *Philyra* the merus of the external maxillipeds is as long as the ischium measured along the inner border; the fingers are stout and compressed, taper gradually from a broad base, and are usually shorter than the hand; the hand is stout, compressed, and if anything a little broader at its distal end than at its base; and when the specimen is laid face downwards on the table, with the chelipeds resting on the table in a semi-flexed position, the fingers open and close in a horizontal plane.

In *Ilia* and *Iphiculus*, on the other hand, the merus of the external maxillipeds is only half the length of the ischium measured along the inner border; the fingers are slender and of almost the same diameter from the base to near the hook-like tip, and are very much longer than the hand; the hand is either subglobular, or tapering-cylindrical with a swollen base; and when the specimen is placed in the position above described, the fingers open and close in either a vertical or oblique plane, and in *Iphiculus* the dactylus can, without any breakage or unnatural dislocation of parts, be moved through an arc of about  $120^{\circ}$ .

Speaking only of the genera known to me by autopsy, the following, though they differ a good deal from *Leucosia* in the characters under consideration, do not differ nearly so much as they do from *Ilia*:—*Pseudophilyra*, *Myra*, *Parilia*, *Randallia*, *Ebalia*, *Nursia*, *Merocryptus*, *Onychomorpha*. *Tlos* and *Oreophorus* also, although their fingers move in a nearly vertical plane, yet in other respects show no close affinities with the *Ilia* type, but rather, through *Nursia*, with the *Leucosia* type; and *Actæomorpha* goes with *Oreophorus*.

On the other hand, the following Indian genera belong to the *Ilia* alliance:—*Myrodes*, *Iphiculus*, *Nursilia*, *Arcania*. *Ira* also, although its fingers are much shorter than the hand, clearly in other respects belongs to this alliance.

I would define these two subfamilies as follows:—

1. Subfamily *Leucosiinæ*. Merus of external maxillipeds more, often much more, than half the length of the ischium measured along the inner border: fingers stout, gradually narrowing from base to tip, seldom much longer, commonly shorter, and often very much shorter than the hand, either opening in a horizontal plane or if in a vertical plane then the immobile finger is markedly more massive than the dactylus, the tip of the dactylus hardly ever movable through an arc

of over  $60^\circ$ : hands stout, generally longer than broad, and compressed, hardly ever broader at the base than at the distal end — when short broad and swollen (as often occurs in the Oreophoroid alliance) then the immobile finger is markedly more massive than the dactylus.

2. Subfamily *Iliinæ*. Merus of external maxillipeds half or less than half the length of the ischium measured along the inner border: fingers slender, almost of the same diameter from base to near tip, either very much longer than the hand, or if shorter than the hand then of filiform slenderness; either opening and closing in a vertical plane, or if in a nearly horizontal plane then the tip of the dactylus is movable through an arc of about  $120^\circ$ : hands either short swollen and subglobular, or tapering-cylindrical with a swollen base, always much broader at the base than at the point of origin of the fingers.

The following is a list of the genera of Leucosoid Crabs, so far as known to me, arranged in accordance with the classification here proposed. Indian genera are printed in Roman type, and all genera known to me by autopsy are marked with an asterisk:—

### Family Leucosiidæ.

#### Sub-family I. *Leucosiinæ*.

#### ALLIANCE I. OREOPHOROIDA.

\* *Actæomorpha*.

? *Carcinaspis*, Stimpson, Proc. Acad. Nat. Sci. Philad. 1858, p. 161.

*Cryptocnemus*, Stimpson, Proc. Acad. Nat. Sci. Philad. 1858, p. 161.

\* *Heteronucia*, *n. gen.*

\* *Merocryptus*, A. Milne-Edwards, Journ. Mus. Godeff. I. iv. p. 84 (260). 1873. [Transition towards *Nursia*].

\* *Oreophorus*.

*Spelæophorus*, A. Milne-Edwards, Ann. Soc. Ent. Franc. (4) V. 1865, p. 148.

\* *Tlos*.

*Uhlias*, Stimpson, Ann. Lyc. Nat. Hist., New York, X. 1874, p. 117.

#### ALLIANCE II. NURSIOIDA.

\* *Ebalia*.

*Lithadia*, Bell, Trans. Linn. Soc. XXI. 1855, p. 305.

\* *Nursia*.

*Phlyxia*, Bell, Trans. Linn. Soc. XXI. 1855, p. 303.

[*Bellidilia*, Kinahan, Journ. Roy. Dub. Soc. I. 1858, p. 128: regarded by Miers, 'Challenger' Brachyura, as synonymous with (*Phlyxia* and) *Ebalia*.]

ALLIANCE III. NUCIOIDA.

- \* Nucia.
- \* Parilia.
- \* Randallia.

ALLIANCE IV. MYROIDA.

*Leucosilia*, Bell, Trans. Linn. Soc. XXI. 1855, p. 295.

- \* Myra (= *Myropsis*, Stimpson).

*Persephona*, Leach, Zool. Miscell. III. 22 (1817) [= *Guaia*, Milne-Edwards, vide Bell, Trans. Linn. Soc. XXI. 1855, p. 292.

ALLIANCE V. LEUCOSIOIDA.

- \* Leucosia.
- \* Onychomorpha (perhaps the only known representative of a distinct alliance).
- \* Philyra.
- \* Pseudophilyra.

Sub-family II. *Iliinæ*.

ALLIANCE I. MYRODOIDA.

*Callidactylus*, Stimpson, Bull. Mus. Comp. Zool. II. 1870-71, p. 157.

- \* Myrodes.

ALLIANCE II. IPHICULOIDA.

- \* Iphiculus.
- \* Pariphiculus, *n. gen.*

ALLIANCE III. NURSILIOIDA.

- \* Heterolithadia.
- \* Nursilia.

ALLIANCE IV. ILIOIDA.

- \* Arcania (= *Iphis*, Leach).
- \* *Ilia*, Leach, Zool. Miscell. III. 19: Milne-Edwards, Hist. Nat. Crust. II. 123.
- Iliacantha*, Stimpson, Bull. Mus. Comp. Zool. II. 1870-71, p. 155;
- Miers 'Challenger' Brachyura, p. 301.
- \* *Ixa*.



I. *Key to the Indian genera of the sub-family Leucosiinae.*

I. Carapace convex or subglobular; subcircular, oval, or hexagonal in outline; its surface may sometimes be more or less covered with bead-like or vesicular granules, but it is generally quite smooth and often polished to the naked eye; the hepatic regions may sometimes form independent convexities, and the intestinal region may sometimes be delimited by a groove or by creases, but as a rule the regions are merged in the general convexity of the carapace. The eyes are very small; and the orbits are complete—the edge of the roof being not, or little, emarginate, and the outer wall, though marked by closed sutures, not being fissured: there is little or no space between the edge of the floor of the orbit and the free edge of the buccal cavern—the two practically coinciding: antennae distinct:—

1. Chelipeds massive: posterior margin of carapace smooth, although sometimes, especially in the young, its extreme ends may be dentiform: intestinal region never tumid and acuminate: merus of external maxillipeds nearly as long as, or sometimes even longer than, the ischium measured along the inner border:—

i. Front narrow, prominent, forming a distinct snout projecting beyond the subhepatic or pterygostomian regions which are never puffed out: buccal cavern elongate: the exopodite of external maxillipeds narrow and elongate, with the outer margin straight:—

a. Either a circumscribed cavity or a deep depression in the ventrad surface of the carapace above the base of the chelipeds .....

b. No cavity in the carapace above the base of the chelipeds .....

ii. Front broad and remarkably truncated, the whole or the greater part of the edge of the buccal cavern being seen beyond it in a dorsal view: buccal cavern broad: exopodite of external maxillipeds broad (often remarkably expanded), its outer and anterior borders forming a continuous nearly semicircular curve .....

2. Chelipeds only moderately stout, or even rather slender: three spines or long petaloid processes on the posterior border, the middle one of which belongs to the tumid intestinal region: merus of external maxillipeds not quite two-thirds the length of the ischium measured along the inner border: pterygostomian regions always puffed out beyond the level of the true antero-lateral margin of the carapace .....

LEUCOSIA.

PSEUDOPHILLYRA.

PHILLYRA.

MYRA.

II. Carapace strongly convex, or globular : circular or oval in outline, the regions usually, but not always, defined by distinct grooves : orbits rather incomplete, the roof being markedly emarginate, and the outer wall being often cleft by fissures (which are sometimes quite-closed sutures) : *a space of remarkable depth between the edge of the lower wall of the orbit and the free edge of the buccal cavern* : posterior margin of carapace most commonly, but not always, armed with spines or tubercles : front truncated, narrow, almost always sunk behind the level of the edge of the buccal frame : *pterygo-femoral regions remarkably puffed out, often convex beyond the front* : merus of external maxillipeds not much shorter than the ischium measured along the inner border : antennae very distinct :—

1. Buccal cavern transversely oblong, much broader than long, owing to the enormous width of the afferent branchial canal and of the exognath, the latter foliaceous with the outer and anterior borders forming a continuous semicircular curve : carapace ovoidal, finely scabrous : chelipeds slender—in the adult male more than four times the length of the carapace.....

## PARILIA.

2. Buccal cavern triangular, exognath not expanded : surface of carapace pustulous or densely vesiculous (if smooth to the naked eye the vesiculous appearance can be detected under a lens) :—

i. Carapace almost circular and globular : legs slender : chelipeds from once and a half to twice and a half the length of the carapace.....

## RANDALLIA.

ii. Carapace transversely oval, manifestly broader than long, its lateral margins coarsely spinate : legs remarkably stout : chelipeds very short and stout.....

## NUCIA.

III. Carapace consisting of two parts namely (1) a low convex subcircular perfectly smooth crown, formed by the carapace proper, and (2) a thin broad unbroken brim formed by the front and the confluent lateral and posterior margins : merus of external maxillipeds considerably longer than the ischium : eyes and orbits as in I : antennae obsolete.....

## ONYCHOMORPHA.

IV. Carapace very rarely approaching a subcircular or ovoidal shape, commonly broad and polygonal : its surface always broken, nodular, tuberculous, wrinkled, or crested ; most commonly the regions are well delimited by grooves or by inequalities of level : almost always a distinct space between the edge of the floor of the orbit and the free edge of the buccal cavern : antennae often indistinct, sometimes obsolete :—

1. Edge of roof of orbit markedly emarginate, so that the retracted eye is a good deal exposed to dorsal view : antennulary fossa in open communication with orbits : space between floor of orbit and free edge of buccal cavern rather narrow : fingers opening in a horizontal plane, and of normal shape : antennae minute, but distinguishable :—

i. Carapace pentagonal or hexagonal, little or not at all broader than long, its lateral borders not expanded, its regions usually tumid and well defined by grooves or in-

<p><b>equalities of surface:</b> antennary flagella minute but distinct: merus of external maxillipeds a great deal more than half the length of the ischium measured along the inner border.....</p> <p>ii. Carapace usually much broader than long, broadly and irregularly pentagonal, its margins thin depressed and expanded, with the edges often jagged; its posterior margin being on a well-defined plane, distinct from, and much lower than, the general plane of the carapace; its surface usually traversed by ridges radiating from the centre, which do not define the regions: antennary flagella minute and difficult to detect: merus of external maxillipeds not much more than half the length of the ischium measured along the inner border .....</p>	ESALIA.
<p>2. Orbits very complete, and not in open communication with the antennular fossae: a broad space between edge of floor of orbit and free edge of buccal cavern: antennary flagella obsolete or very minute: carapace very markedly broader than long, its surface remarkably nodular, or eroded, or both; expanded laterally so as sometimes to partly or entirely conceal the legs in flexion: merus of external maxillipeds a good deal more than half the length of the ischium: immobile finger markedly more massive than the dactylus:—</p> <p>i. Lateral expansions of carapace entirely concealing the legs in flexion: basal antennal joint though tightly filling the gap at the inner canthus of the orbit, yet quite independent: fingers clumsy, cupped on the inner face, closing in a vertical plane, the immobile finger monstrosous:—</p> <p>a. Carapace enormously convex, honeycombed by large symmetrically-disposed undermined caverns and channels.....</p> <p>b. Carapace humped behind, flattened and cupped at the sides, the lateral margins formed each of three broad foliaceous lobes which are fused but still display the sutures.....</p> <p>ii. Sides of carapace only partly or slightly concealing the legs in flexion: basal antennal joint fused with the orbit, which except for a narrow fissure in the lower wall forms an unbroken ring:—</p> <p>a. Antennae quite obsolete: fingers shorter than palm, opening obliquely: abdomen in both sexes with all the segments separate: meropodites of legs somewhat concealed, in flexion, by the carapace.....</p> <p>b. Antennary flagella present, very minute: fingers longer than palm, opening vertically: abdomen of female (male unknown) with the 3rd-6th terga indistinguishably fused: legs hardly at all concealed, even in flexion, by the carapace</p>	<p>ORROPHORUS.</p> <p>TLOS.</p> <p>ACTEOMORPHA.</p> <p>HETERONUCIA.</p>

II. *Key to the Indian genera of the sub-family Ilinæ.*

- I. Hands not much longer than broad, short squat swollen or subglobular: fingers always much longer than the hand, opening either in an obliquely vertical or sometimes in a nearly horizontal plane:—
  1. The whole body and appendages covered with a close spongy pubescence:—
    - i. Carapace much broader than long, its antero-lateral margins armed with large spines increasing in size from before backwards: tip of dactylus movable through an arc of about  $120^{\circ}$  ..... *IPHICULUS.*
    - ii. Carapace oval (longitudinally) or globular, its margins with small dentiform tubercles: tip of dactylus movable through an arc of about  $70^{\circ}$  ..... *PARIPHICULUS.*
  2. Carapace practically free of pubescence:—
    - i. Carapace longer than broad, elongate-oval, smooth, shaped almost exactly as in *Myra*: tip of dactylus movable through an arc of about  $120^{\circ}$  ..... *MYRODES.*
    - ii. Carapace broader than long, not smooth:—
      - a. Carapace polygonal, with the lateral margin laminar and sinuous or jagged, and with some definite ridges and spines on the surface—shaped, in fact, much as in *Nursia*: tip of dactylus movable through an arc of about  $130^{\circ}$  ..... *NUSSERIA.*
      - b. Carapace oval, its surface closely granular and nodular, the hepatic regions much sunken: tip of dactylus movable through an arc of about  $70^{\circ}$  ..... *HETEROLITHADIA.*
- II. Hands much longer than broad, tapering from a swollen base: fingers opening in a nearly vertical plane, the tip of the dactylus movable through an arc of  $60^{\circ}$  to  $70^{\circ}$ :—
  1. Carapace more or less globular, its margins with definitely-disposed large spines or tubercles: fingers either longer or not very much shorter than the hand ..... *ARCANIA.*
  2. Sides of the carapace produced into two huge cylindrical sausage-shaped processes: median regions of the carapace separated from the lateral regions by broad channels or grooves: figures not half the length of the hand ... ..... *IXA.*

*Actæomorpha*, Miers.

*Actæomorpha*, Miers, Journ. Linn. Soc. Zool., Vol. XIII. 1878, p. 184.

Carapace Cancroid, convex, granular. Front broad, not projecting much. Orbits quite complete. *Antennary flagella absent, basal joint present and fused with the orbit to form its inner wall.* The antennules fold obliquely.

The external maxillipeds close the buccal cavern completely: their exopodite is narrow, with the outer edge almost straight: the triangular merus is about two-thirds the length of the ischium measured along the inner border.

Chelipeds massive, not, or hardly, longer than the carapace: hand short and broad, and about the same length as the stout compressed fingers.

True legs short and stout: the meropodites, in flexion, are somewhat hidden beneath the carapace.

The abdomen in both sexes has all seven terga distinctly separate, and in the male is narrow-ovate.

In general appearance *Actæomorpha*, as Miers states, much resembles the Cancroid *Actæa granulata*: it is, however, a true Leucosid, and closely related to *Oreophorus*, as Miers has stated.

*Key to the Indian species of Actæomorpha.*

1. Regions of carapace separated by deep clean cut channels ... .. *A. morum*.
2. Regions of carapace separated by shallow shelving grooves ... .. *A. lapillulus*.

16. *Actæomorpha morum*, n. sp. Plate VIII. fig. 3.

Carapace broader than long, somewhat oval, strongly convex, closely covered—like the whole body—with large smooth crowded vesiculous granules. The regions of the carapace as a whole are completely isolated from a broad marginal ring by a broad sculptured circumferential groove, a very narrow bridge alone connecting the front with the gastric region: and the regions are again most elegantly isolated from each other (1) by two obliquely-longitudinal channels that cut off the acutely-triangular gastro-cardiac region from the somewhat reniform branchial regions, and (2) by a transverse channel that cuts off the semi-oval intestinal region—the channels being all in communication with the marginal channel. The isolated marginal ring consists of the front, which is thickened, broad, and slightly prominent; of the posterior margin, which is thickened, slightly curved, and slightly prominent; and of four sharp-cut lateral lobes on either side.

The eyes and orbits are visible in a dorsal view.

The chelipeds and legs are closely crowded with large granules, which on the under surface are smooth and vesiculous, and on the upper surface are spiniform. The chelipeds in the female are about as long as the carapace: the hands are about as long as the fingers: the fingers are traversed by close rows of tiny granules nearly to the tip. The legs are stout and short, with very slender hairy dactyli: in flexion they are somewhat hidden by the carapace.

Orange colour in spirit.

Two females from a bottom of sand and shells, off the Ganjam Coast, 28 to 30 fathoms. They do not seem to be quite adult, and the carapace is 10 millim. long and 12 millim. broad.

#### 17. *Actaeomorpha lapillulus*, n. sp.

Carapace broader than long, strongly convex, crowdedly pustulous: its regions are all well-defined by shallow grooves, and the branchial and intestinal regions are also separated from the margin by shallow grooves. The front is somewhat prominent, and is obscurely bilobed; the hepatic regions though dorsally sunken are angularly convex in the antero-lateral margin, the lateral margins are coarsely and bluntly three-lobed, and the posterior margin is thickened and somewhat prominent. The eyes are hardly visible in a dorsal view. The under surface of the body is closely granular.

The chelipeds are everywhere nodular and pustulous, and the legs are more or less granular on the under surface, and are covered on the dorsal surface with crowded spiniform granules. The chelipeds in the female are about as long as the carapace, and the hands are about as long as broad and not much longer than the fingers. The legs are stout and short, and are somewhat hidden by the carapace in flexion,—that surface of the carapace being somewhat grooved by the pressure of the meropodites.

Colours in spirit: yellowish white, mottled with orange.

Two males and a female from off Ceylon, 34 fms., and a female from off Ceylon 32 fms., the bottom in both cases consisting of broken coral and shells.

The largest specimen—a female not quite adult—has a carapace 9 millim. long and 11 millim. broad.

#### *Oreophorus*, Rüppell.

*Oreophorus*, Rüppell, Beschreibung, etc., Kurzschwänzigen Krabben des rothen Meeres, p. 18 (1830).

*Oreophorus*, Milne-Edwards, Hist. Nat. Crust. II. 130.

*Oreophorus*, Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 306, and Cat. Leucos. Brit. Mus. p. 18.

Carapace broadly semi-elliptical or subpentagonal, so that its postero-lateral margins overhang and completely conceal the legs in flexion (much as in *Calappa*); strongly convex, nodose, and often symmetrically eroded or honey-combed. The front forms a distinct, slightly upturned, triangular projection, with the orbits almost on its under surface.

Eyes small; orbits quite complete, the inner canthus being completely closed by the tight-fitting basal antennal joint. No antennary flagella. Antennules folding obliquely.

The external maxillipeds close the buccal cavern completely: their exopodite is narrow, with the outer edge almost straight: the triangular merus is nearly two-thirds the length of the ischium, measured along the inner border.

Chelipeds massive, not very much longer than the carapace: hand short and broad: fingers about twice as long as the hand, their inner surface hollowed like a spoon: the immobile finger enormously massive.

True legs small, and hidden, when flexed, by the lateral expansions of the carapace.

The abdomen of the male consists of three pieces, and is acutely triangular; that of the female consists of four pieces.

In India these little crabs are found only on bottoms of dead coral shingle, to the eroded fragments of which the crabs themselves have a most extraordinary likeness, the likeness being increased by an encrusting growth of *Foraminifera*, *Polyzoa*, etc., to which the crabs like the shingle, are subject.

#### 18. *Oreophorus reticulatus*, Adams & White.

*Oreophorus reticulatus*, Adams and White, 'Samarang' Crustacea, p. 54, pl. vi. fig. 1 (1850): Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 307, and Cat. Leucos. Brit. Mus. p. 19: A. Milne-Edwards, Ann. Soc. Ent. Franc. (4) V. 1865, p. 151: Miers, Zool. H. M. S. 'Alert,' pp. 185, 254: A. O. Walker, Journ. Linn. Soc., Zool., XX. 1890, p. 111.

Carapace with three caverns, diminishing in size from before backwards, excavated just inside the front and lateral margins on either side. The caverns have undermined edges, and the first communicates with the second by a tunnel, while the second may sometimes (young) have an open communication with the third, and sometimes (adults) only the remains of a communication.

The intestinal region and the true posterior margin are insulated from the rest of the carapace by an undermined channel, which sends forwards a short branch on either side of the cardiac region. The

branchial regions are remarkably tumid, and their surface, like that of the non-excavated parts of the carapace, is reticulate-punctate: the floors of the caverns are either smooth or granular; the floor of the channel has bead-like granules scattered over it.

The whole under surface of the body is rough and granular.

The chelipeds are not quite  $1\frac{1}{2}$  times the length of the carapace, and are nodular and granular: the hand is rather broader than long, and not much more than half the length of the fingers: along the outer surface of both fingers is a row of pits. The legs are slender, and are covered up to the tips of the dactyli with crisp, clavate, spiniform, or arborescent granules.

An adult (ovigerous) female has the carapace nearly 11 millim. long, and 14 millim. broad.

In the Indian Museum are 12 females and a young male from off Ceylon, 34 fms., off the Malabar coast, 28 fms., and from the Persian Gulf.

The abdomen of the young male is sunk below the level of the sternum.

18a. *Oreophorus reticulatus*, var. *alcicornis*, nov.

Differs from the common form in the following particulars:—

(1) The caverns are much larger, the two just behind the front being separated by a very narrow bridge.

(2) On either branchial region are three coarse spines—one on the summit and two on the lateral border: the spine on the summit is vertical and has a bifid tip.

(3) The eyes are not at all visible in a dorsal view.

A single adult female from off the Ganjam Coast, 28 fms.

Carapace 14 millim. long, 19 millim. broad.

*Tlos*, Adams and White.

*Tlos*, Adams and White, 'Samarang' Crustacea, p. 57.

*Tlos*, A. Milne-Edwards, Nouv. Archiv. du Mus. X. 1874, p. 51.

*Tlos* differs from *Oreophorus* chiefly in having the anterior and lateral parts of the carapace flat and the margin of the carapace turned up, so that although the cardiac and parts of the branchial regions are convex, the carapace as a whole is cupped. This is in marked contrast with the inflated form of *Oreophorus*, and constitutes the only difference between the two forms.



19. *Tlos petraeus*, A. Milne-Edwards.

*Tlos petraeus*, A. Milne-Edwards, Nouv. Archiv. du Mus. X. 1874, p. 51, pl. iii. fig. 1.

Carapace broadly pentagonal; with the front somewhat produced, bluntly triangular, and slightly emarginate. The margins of the carapace are thickened, roughened, and somewhat upturned. Each wing of the carapace shows a division into three broad lobes, but the divisions are only sutures, not gaps. Except for a ridge running from the front to the cardiac region, and except for a granular node just external to the cardiac region on either side and for a little thickening between each node and the postero-lateral angle, the surface of the carapace is smooth and concave. The under surface of the body is granular. The orbits are almost ventral in position, and the eyes are not visible in a dorsal view.

The chelipeds in the female are not quite as long as the carapace: the arm is trigonal with enlarged granules along all its borders, the wrist and hand are rough, and the dactylus is fluted. The hand is as broad as long, and is continued without any sort of constriction into the great shovel-shaped immobile finger, which is about as long as the hand and vastly more massive than the dactylus. The legs are compressed, and have their dorsal and ventral surfaces granular: in flexion they are hidden beneath the wings of the carapace.

In the abdomen of the male the terga although a good deal fused are all separately recognizable, and there is a denticle in the middle line on the 4th and 6th.

An adult (ovigerous) female has the carapace 7 millim. long, and 10 millim. broad.

Andamans, Off Ceylon 34 fms., Pedro Shoal 20 fms. Eight specimens.

20. *Tlos patella*, n. sp. Plate VIII. fig. 4.

Carapace transversely oval, and closely covered with granules which under the lens are fungiform: the carapace is traversed by a longitudinal ridge, and the branchial regions are convex in their posterior part; but the wings of the carapace are cupped dorsally, much as in *T. petraeus*, and are divided by closed sutures into three broad lobes.

The front hardly breaks beyond the general outline of the carapace, and has its edge thickened. The eyes can just be seen in a dorsal view.

The intestinal region is convex backwards, and the bilobed (true) posterior margin still more so.

The under surface of the body is granular, much like the upper surface.

The chelipeds in the female are about one-fourth longer than the carapace, and are closely covered with small flat smooth granules: the arm is trigonal, with larger granules along the edges: the hand is somewhat inflated, a little longer than broad, and not much more than half the length of the fingers: the fingers are curved and are hollowed on the inner face: the immobile finger is distinctly constricted off from the hand, and is not vastly more massive than the mobile finger.

The legs are as in *T. petræus*.

The largest adult (ovigerous) female has the carapace 9 millim. long and 11 millim. broad.

*Loc.* Andamans. Seven females.

*Heteronucia*, n. gen.

Carapace strongly convex, broader than long, its surface both granular and tubercular (or coarsely spinous): the regions distinct.

Front bidentate, sunk behind the edge of the mouth-parts and of the puffed out pterygostomian regions.

Orbits complete but shallow, not concealing the rather large eyes in flexion. The basal antennal joint is fused with the orbit and with the front, and the extremely minute antennary flagellum is entirely inside the orbital wall. The antennules fold obliquely.

The epistome is exceptionally broad.

The external maxillipeds completely close the buccal cavern; the exopodite is narrow, with the outer edge straight; the merus is about two-thirds the length of the ischium measured along the inner border.

The chelipeds are massive and are about half again as long as the carapace: the hand is short, broad and swollen: fingers a good deal longer than the hand, stout, closely meeting throughout their extent, curved and concave on their inner face, opening vertically: the immobile finger is a good deal more massive than the dactylus.

Legs stout, the meropodites slightly hidden in flexion.

This species has, at first sight, a general resemblance to *Nucia speciosa*, but is at once distinguished by the form of the orbits, antennæ and chelipeds.

21. *Heteronucia vesiculosa*, n. sp. Plate VIII. fig. 1.

The whole surface of the body and of the appendages (except the fingers and dactyli) is covered with crowded vesiculous granules without any space between them.

Carapace a good deal broader than long, strongly convex: on either lateral margin are eight coarse spines or acute tubercles, the first of which is at the antero-external angle of the buccal cavern, the last of which is at the junction with the posterior border: in addition the

whole dorsum of the carapace is occupied by a "pyramid" (as on the billiard table) of 8 or 9 similar coarse spines or acute tubercles—the apex of the pyramid being on the intestinal region—and there is, further, a coarse denticle on either hepatic region: the surface of all these is densely vesiculous.

The front is broadly bidentate, and the whole of the front edge of the buccal cavern and of the tips of the external maxillipeds can be seen beyond it in a dorsal view. There is a tubercle near the base of the distal piece of the exognath.

The chelipeds are stout, and are rather more than half again as long as the carapace: the hand is subglobular: the fingers are somewhat longer than the hand, are elegantly grooved, meet in all their extent, open nearly vertically, and are hollowed and curved inwards; the dactylus is less massive than the immobile finger: at the base of the dactylus, on the upper surface of the hand is a small tubercle.

The abdomen of the female consists of 4 pieces—the 3rd to 5th terga being fused.

Colours in spirit light orange yellow.

An ovigerous female has the carapace 5 millim. long and 6 millim. broad.

*Loc.* Off Ceylon, 34 fms.

#### *Nursia*, Leach.

*Nursia*, Leach, Zool. Miscell. III. p. 18.

*Nursia*, Milne-Edwards, Hist. Nat. Crust. II. 137.

*Nursia*, Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 307, and Cat. Leucos. Brit. Mus. p. 19.

Carapace with a broad, usually depressed, symmetrically-wrinkled surface, and with expanded, foliaceous, sinuous, scalloped, or jagged lateral and posterior margins,—the lateral margins somewhat concealing the true legs in flexion. Front projecting beyond the epistome and usually well beyond the eyes.

Orbits with two sutures in the roof, and a gap at the inner canthus, and with the upper-outer wall so emarginate as to leave the fully-retracted eye exposed to dorsal view.

Antennules folding obliquely. Antennæ, minute, situated in the inner canthus of the orbit.

Buccal cavern about as long as it is broad at base, and somewhat narrowed anteriorly; the exognath not dilated, its outer edge a little curved: the triangular merus is a little over half the length of the ischium, measured along the inner edge.

The chelipeds relatively to the legs are very massive: in the male they vary from  $1\frac{1}{2}$  times to over twice the length of the carapace:

arms sharply trigonal; hands a good deal compressed; fingers stout and compressed, about half or two-thirds the length of the hand.

The abdomen of the male consists, usually, of 3 pieces, that of the female of 4.

*Key to the Indian species of Nursia.*

- I. An oblique ridge crossing either hepatic region, in addition to the longitudinal, transverse, and epibranchial ridges: upper surface of hand convex, but without a conspicuous median ridge:—
  1. The posterior margin of the carapace has the form of two blunt semicircular lobes: the lateral margins are sinuous, or only bluntly jagged: chelipeds in the adult male less than twice the length of the carapace:—
    - i. Lateral margins jagged: front with a coarse thickened granular edge, and not projecting much beyond the eyes: carapace much broader than long ... *N. plicata.*
    - ii. Lateral margins sinuous: front in the form of a large ovate snout, projecting far beyond the eyes: carapace nearly as long as broad:—
      - a. Outer surface of wrist and hand bluntly and inconspicuously carinate: ridges of carapace coarse and granular: snout semicircularly rounded ... *N. blanfordi.*
      - b. Outer surface of wrist and hand sharply and conspicuously cristate: ridges of carapace clean-cut: snout ovate-pointed *N. nasuta.*
  2. The posterior margin of the carapace has the form of two sharp laminar teeth: the lateral margins are sharply jagged: front sharp denticulate:

- chelipeds, in the adult male, more than twice the length of the carapace *N. hardwickii*.
- II. No trace of an oblique ridge on the hepatic regions or of a transverse ridge behind the branchial regions, the longitudinal and epibranchial ridges alone present: posterior margin not manifestly bilobed: upper surface of hand traversed from base to finger-cleft by a distinct ridge:—
1. Carapace convex: front broadly bidentate ... .. *N. persica*.
  2. Carapace almost laminar: front broadly pointed ... .. *N. abbreviata*.
- III. No ridges at all on the carapace: margins not manifestly sinuous ... .. *N. rubifera*.

22. *Nursia plicata*, (Herbst) *nec auctorum*.

*Cancer plicatus*, Herbst, Krabben III. iv. 2, pl. lix. fig. 2.

Carapace about three-quarters as long as broad, with the posterior margin in the form of two semi-circular dorsally-concave lobes. The foliaceous lateral margins are scalloped, each into four blunt teeth: in front of the first of these (which is rounded off), on either side, is a thickened marginal nodule; and the last, on either side, are united by a coarse granular ridge running across the carapace parallel with the posterior margin, which it cuts off from the rest of the carapace. This ridge culminates, in the middle line, in a coarse granular tubercle.

The middle of the carapace forms a coarsely-granular eminence surmounted by 3 tubercles in a triangle. From it six blunt coarsely-granular ridges radiate, as follows:—one forwards, in the middle line, to the front; one backwards, in the middle line, to the transverse ridge; one obliquely forwards, across the hepatic region on either side, to the nodule on the hepatic margin; and one obliquely backwards to the penultimate lateral tooth on either side. The spaces between the ridges are markedly concave, and are usually smooth.

The front hardly projects beyond the eyes, and has a coarse thickened granular edge: it is usually obscurely bilobed, and never quadridentate.

The surfaces of the external maxillipeds, of the pterygostomian regions, of the thoracic sterna, and of the proximal part of the male abdomen are distinctly granular.

The chelipeds in the adult male are  $1\frac{1}{4}$  times, in the adult female about  $1\frac{1}{4}$  times the length of the carapace: the arm has only its outer border

carinate,—the carina being coarse and granular ; the base of its upper surface, the inner border, and the base of the under surface and the under border are also granular to the naked eye : the outer edges of the wrist and hand are coarsely and inconspicuously carinate : the fingers are stout, are rather strongly bent inwards, and have the opposed edges almost edentulous : *the dactylus is more than three-quarters the length of the outer border of the hand*, in both sexes.

The true legs are not much longer than the arm, and are compressed : in all the merus and propodite are sharply carinate dorsally and ventrally, the carpus has two sharp dorsal crests, and the dactylus is closely pubescent.

The abdomen of the male consists of two linear basal pieces and a small triangular apical piece, and between the two a long triangular plate with a median sub-terminal tooth.

Length of carapace of the largest male, 15 millim., breadth 20 millim. : length of carapace of largest female 16 millim., breadth 22 millim.

Old spirit specimens are uniform flesh-colour : but fresh spirit specimens are a bright brick red, with the wings of the carapace, and a medium longitudinal band including the front, yellowish white.

In the Indian Museum are 8 adult males, 6 adult and egg-laden females, and one young, from the Orissa Coast, Tinnevely coast, Palk Straits, Bombay, Karachi, and the Persian Gulf. [Besides these there are 4 adult females and a male from Hongkong].

### 23. *Nursia hardwickii*, Leach.

*Nursia hardwickii*, Leach, Zool. Miscell. III., p. 20 : Desmarest, Consid. Crust. p. 166 : Milne-Edwards, Hist. Nat. Crust. II. 137.

*Nursia plicata*, Bell, Trans. Linn. Soc. Vol. XXI. 1855. p. 307, pl. xxxiv. fig. 4, and Cat. Leucos. Brit. Mus., p. 19 (nec Herbst) : Stimpson, Proc. Ac. Nat. Sci. Philad. 1858. p. 161 (?) : Miers, Trans. Linn. Soc. Zool., (2) I. p. 240, pl. xxxviii. fig. 28 : Haswell, Cat. Austral. Crust. p. 127 (?) : de Man, Notes Leyden Mus. III. 1881, p. 129 : A. O. Walker, Journ. Linn. Soc., Zool., Vol. XX. p. 111 (?) : J. B. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 404.

The general form is that of *N. plicata* Herbst, but much finer and cleaner cut ; and with the anterior part of the carapace narrower and the front projecting.

*The posterior margin of the carapace has the form of two sharp-cut laminar teeth ; and the three last teeth on either lateral margin are thin and sharp.*

The crests on the carapace are thin and sharp, and very finely granular ; and the elevation from which they radiate is defined by three sharp denticles : the transverse ridge that unites the two last marginal teeth across the carapace culminates, in the middle line, in a denticle.

The front distinctly projects beyond the eyes; its margin is thin and sharp and is cut into four teeth: the antero-lateral margins do not run up to the level of the tip of the front, involving the orbits, as they do in *N. plicata*.

The granulation on the ventral surfaces, unlike that of *N. plicata*, is hardly visible to the naked eye.

The chelipeds in the adult male are  $2\frac{1}{3}$  times, in not-quite-half-grown males  $1\frac{1}{2}$  times, and in adult females  $1\frac{1}{2}$  times the length of the carapace: to the naked eye they are perfectly smooth: the outer edges of the arm, wrist and hand are sharply carinate: the dactylus in the male is little more than half the length of the outer edge of the hand.

Uniform flesh-colour in spirit.

Length of carapace in the adult male 14 to 15 millim., breadth about 19 millim.; in the adult female length 12 to 13 millim., breadth about 16 millim.

In the Indian Museum collection are 18 adult males, 8 adult females, and 2 young males taken at various places along the Coromandel coast, from Ganjam to Pondicherry.

#### 24. *Nursia blanfordi*, n. sp. Plate VII. fig. 5.

Carapace, except that it is nearly as long as broad, of the same general appearance as in *N. plicata*, Herbst, with the same two semi-circular lobes on the posterior margin, and the same number of blunt teeth on the lateral margin,—the teeth, however, being blunter, and the first two on either side nearly confluent.

The ridges that radiate from the centre of the carapace, though of the same coarse and coarsely-granular form as in *N. plicata*, differ somewhat in arrangement: the median longitudinal ridge, the ridges that run obliquely outwards to the hepatic margin on either side, and the transverse ridge that unites the last lateral teeth across the carapace, are the same; but the epibranchial ridges that run to the penultimate lateral tooth on either side are so little oblique in the greater part of their extent as to form an almost transverse crest across the carapace, parallel with the first-mentioned transverse ridge and with the posterior margin. The triangle of denticles on the mid-gastric region, and the denticle on the second transverse crest are as distinct and sharp, especially in the male, as they are in *N. hardwickii*.

The front has the form of a semi-circular foliaceous snout, projecting far beyond the eyes, and somewhat recurved upwards.

Both the exopodite and the endopodite of the external maxillipeds are traversed longitudinally by a raised line of enlarged granules.

The chelipeds in the male are about  $1\frac{3}{4}$  times, in the female about

1½ times, the length of the carapace, and their surface is everywhere finely granular, except on the fingers, which are of the same form and proportions as in *N. plicata*: the arm is trigonal, with all the edges sharp, and the outer edges of the wrist and hand are coarsely, but distinctly, carinate.

The legs have the merus, carpus and propodite faintly carinate dorsally.

The abdomen of the male consists of 3 pieces, the large middle piece having a subterminal denticle.

Colours in spirit, uniform light brownish.

The ovigerous female has the carapace 8 millim. long and 8.5 millim. broad: the male is slightly smaller.

Persian Gulf, 52 fathoms, dredged by Mr. W. T. Blanford, F. R. S., to whom the Indian Museum collections owe so many valuable additions. Also from the Mekran coast. Six specimens are in the Indian Museum.

25. *Nursia nasuta*, n. sp. Plate VII. fig. 6.

Resembles *N. blanfordi* in almost all its characters, especially in having the carapace nearly as long as broad, and the front in the form of a large curved foliaceous snout; but differs in the following particulars:—

(1) the front is sharper and even longer, and in shape is pointed-ovate:

(2) the ridges of the carapace are little granular, and the oblique ridges that cross the hepatic regions are obsolescent:

(3) the outer edge of the wrist and of the hand are raised each into a thin sharp high crest:

(4) the size is even more minute, the largest specimens (ovigerous females) having the carapace from 5 to 6 millim. long and from 5.25 to 6.25 millim. broad.

*Loc.* Off the Malabar coast, 28 fathoms. Two adult males and 6 adult females.

26. *Nursia persica*, n. sp. Plate VII. fig. 7.

Carapace about nine-tenths as long as broad, its lateral margins expanded and cristiform, but not scalloped, only sinuous (much as in *N. abbreviata*), forming three shallow lobules on either side: posterior margin laminae, perfectly straight, with a spot of dark red (in spirit) pigment in the middle line.

The carapace, which is rather strongly convex, is traversed longitudinally, in the middle line, by a broad sharp-edged ridge that ends



at a tubercle in the intestinal region, and is again crossed transversely by a similar ridge, which is strongly convex forwards: these are the only ridges on the carapace.

The front has the form of two broad sharp-cut teeth which are prominent beyond the eyes.

The outer margins both of the endopodite and of the exopodite of the external maxillipeds are granular and somewhat raised.

The exposed surfaces of the thoracic sterna, and of the carapace round the bases of the chelipeds, are covered with large granules (in the female—male unknown).

The chelipeds in the female are very little longer than the carapace: the arm is sharply trigonal, with the edges coarsely granular: the wrist and hand have the upper surface rough: the edges of the hand are sharp, and the upper surface of the hand is traversed, from its base to the finger-cleft, by a sharp finely-beaded ridge, as in *N. abbreviata*: the fingers (in the female) are about two-thirds as long as the hand, and are finely denticulate.

The legs are slender and compressed, with the merus, carpus and propodite sharply carinate dorsally.

Colours in spirit: mottled like Castile soap.

Length of carapace 9 millim., breadth 10.5 millim.

A single ovigerous female from the Persian Gulf.

This species well illustrates the close relation between *Nursia* and *Tlos*.

## 27. *Nursia abbreviata*, Bell.

*Nursia abbreviata*, Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 308, pl. xxxiv. fig. 5, and Cat. Leucos. Brit. Mus. p. 20: Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 404.

Carapace about eight-ninths as long as broad, abnormally depressed—almost laminar—except in the mid-gastric region, which is somewhat angularly elevated: its borders, behind the front, are thin, foliaceously expanded and sinuous, forming 7 shallow lobules, the least distinct of which is the posterior border, which again is very inconspicuously subdivided by a faint emargination in the middle line: the whole of the free edge of the carapace is finely beaded, and slightly upturned, so as to emphasize the depressed appearance of the carapace.

An anteriorly-convex milled carina crosses the carapace from one lateral margin to the other, and is met in the middle line by a milled ridge running from the front: these are the only ridges on the carapace. There is granular elevation in the cardiac region, otherwise the carapace is smooth. The front is broad and prominent with the edge a little convex.

The pterygostomian region is traversed by a sharp ridge that runs parallel with the antero-lateral border.

The external maxillipeds, the edge of the sternum, and the entire edge of the fossa that receives the abdomen, are ornamented with beadlike granules, in the male.

The chelipeds in the male are a little more than half again as long as the carapace and in the female are not one-fourth longer than the carapace: the arm is sharply trigonal, with all the edges granular and the surfaces smooth: the upper surface of the wrist and hand are traversed, up to the finger cleft, by a sharply-raised beaded ridge: the fingers are about two-thirds the length of the hand, and meet only at tip.

The abdomen of the male consists of three pieces, the long middle piece having a sub-terminal denticle.

Colours in spirit: yellowish-brown mottled with greenish-brown, which on the arm, on the base of the hand, on the base of the fingers, and on the legs, forms cross-bands.

Eight males and five adult females, from Karáchi, the carapace of the largest male and female being 9 millim. long, and 10 millim. broad. Three very young specimens from the Coromandel coast are almost certainly this species.

## 28. *Nursia rubifera*, Müller.

*Nursia rubifera*, Müller, Verhandl. Naturforsch. Ges. Basel, VIII. 1886, p. 480, pl. iv. figs. 4, 4a, 4b.

Carapace broader than long, outline oval, — very inconspicuously polyhedral, edge cockled and finely granular. Front prominent, *bilobed*. Two isolated granular tubercles in the middle line — one in the gastric, one (smaller) in the cardiac region; but *no ridges*. Outer border of exognath strongly curved. Chelipeds in the male about half again as long as the carapace: arm sharply trigonal, with all three edges granular: a sharp longitudinal ridge on upper surface of hand: fingers meeting throughout their extent.

Irregular lilac stripes on the carapace and cross-bands on legs.

*Loc.* Trincomalee.

Not in the Indian Museum collection. Known here only from Müller's description and figures.

The species, as Müller says, is nearest allied to *N. abbreviata*, and is also closely related to *N. persica*.

## *Ebalia*, Leach.

*Ebalia*, Leach, Malac. Pod. Brit. text of pl. xxv. and Zool. Miscell. III. p. 18.

*Ebalia*, Milne Edwards, Hist. Nat. Crust. II. 128.

*Ebalia*, Bell, Brit. Stalk-eyed Crust. p. 139, and Trans. Linn. Soc. Vol. XXI. 1855, p. 303, and Cat. Leucos. Brit. Mus. p. 16.

*Ebalia*, Miers 'Challenger' Brachyura p. 303 (part).

Carapace rhomboidal or pentagonal or hexagonal; commonly, but not always, a little broader than long; its regions generally well defined and tumid, the tumid portions nodular or granular: its posterior margin is generally a little prominent and either bilobed, or with its extreme ends dentiform.

The front is not much produced in Indian species, except in *Ebalia* (*Phlyxia*) *erosa*.

In the orbital wall, as usual, there are three sutures, and a gap at the inner canthus: the edge of the roof of the orbit is considerably emarginate. The antennules fold obliquely or nearly transversely. The antennæ are minute but distinct.

The buccal cavern is moderately elongate: the exopodite of the external maxillipeds is not dilated, its outer edge is a little curved: the triangular merus of the external maxillipeds is about  $\frac{3}{4}$  the length of the ischium measured along the inner border.

The chelipeds are variable: they are usually massive. In the typical *Ebalia* forms they are short—not much more than half again as long as the carapace—and stout, with short broad hands not much differing in length from the stout compressed fingers.

The abdomen of the male consists of 3 or 4 pieces.

*Key to the Indian species of Ebalia.*

- I. Front much produced: carapace markedly longer than broad ..... *E. erosa*.
- II. Front not produced: carapace either a little broader than long or a very little longer than broad:—
  1. Edge of buccal cavern projecting a little beyond the front: posterior border of the carapace with three rounded teeth in the male and two (much less distinct) in the female: a large granular "broad arrow" on the carapace the ends of the wings of which project beyond the postero-lateral margin... *E. sagittifera*.
  2. Edge of front projecting beyond the epistome: ends of posterior margin thickened and obscurely dentiform.

- i. Dorsum of carapace deeply and very elegantly trilobed longitudinally..... *E. diadumena*.
- ii. Carapace hexagonal, dorsum with 4 granular swellings arranged in a "cross"... *E. wood-masoni*.

I have not included the species referred to by Dr. Henderson as *Ebalia pfefferi* and *Ebalia fallax* in this key, because the first appears to belong to Dana's genus *Nucia*, which in my opinion has no close affinity with Leach's genus, while the second is quite clearly a form belonging to the *Ilia* alliance, as it has the *Ilia* fingers hands and external maxillipeds.

29. *Ebalia diadumena*, n. sp. Plate VII. fig. 4.

Carapace rhomboidal, a little broader than long, its dorsal surface divided into three tumid crisply granular and most elegantly shaped lobes (a gastro-cardiaco-intestinal and two branchial—forming a sort of *plour de lys*) by two extremely deep smooth longitudinal furrows. On the middle lobe the gastric and cardiac regions are separated by a shallow groove, and the cardiac and intestinal by a deep furrow. The hepatic regions are also distinctly circumscribed, but are altogether on a much lower plane than the rest of the carapace, and like the front are only indistinctly granular.

The front is divided, from its hardly emarginate edge down to the gastric region, by a narrow deepish longitudinal groove. Behind the front the angular pterygostomial ridge is somewhat prominent. The lateral margins are finely crenulate: the posterior margin is almost straight, with the ends somewhat dentiform.

The surfaces of both branches of the external maxillipeds are tumid and granular.

The chelipeds in the female (male unknown) are not very much longer than the carapace: the arm is trigonal and the greater part of all its surfaces is crisply granular, as also are large parts of the surfaces of the wrists and hands: the fingers are not much shorter than the hand and are elegantly striate-granular: the hand is not very much longer than broad.

The carapace of the adult female is 4 millim. long and 4.5 millim. broad.

A single ovigerous female from Palk Straits.

Colours in spirit lilac brown, the furrows on the carapace dark violet brown.

30. *Ebalia woodmasoni*, n. sp. Plate VII. fig. 3.

Carapace sharply hexagonal, its length just exceeds its breadth in the male, its breadth is equal to its length in the female.

Four large well-defined (especially in the male) granule-capped swellings or tubercles mark, respectively, the cardiac, intestinal, and branchial regions, and two small indistinct swellings mark the hepatic regions: the hollows between the larger swellings are elegantly punctulate.

Antero-lateral borders finely and inconspicuously, postero-lateral and posterior borders finely and distinctly beaded; the posterior border prominent and straight, with its ends more prominent—giving it a bilobed appearance.

Front angularly emarginate or broadly bidentate. Eyes rather large and not well concealed by the orbits.

Exposed parts of sternum granular, the first segment, in the male, with a strong longitudinal ridge or boss near the base of either cheliped.

Chelipeds in both sexes half again as long as the carapace: arm trigonal, its upper surface with some rows of enlarged beadlike granules along both borders, its under surface with a broad tapering band of similar granules: hand nearly twice as long as broad, and from  $\frac{1}{4}$  to  $\frac{1}{3}$  longer than the fingers.

Abdomen of male with a very strong terminal tooth on its penultimate segment.

In the male the carapace is 5 millim. long and 4.8 millim. broad, in the adult female it is 5 millim. in both dimensions.

*Loc.* Andamans.

This species appears to be near *Ebalia quadrata*, A. M.-E., from Bass' Straits, and to Miers' *Ebalia rhomboidalis*, *minor* and *bituberculata*, from Japan.

31. *Ebalia sagittifera*, n. sp.

Carapace hexagonal, although hardly longer than broad yet of an elongate appearance, owing to the unusual length and very gradual convergence of the postero-lateral borders: the whole antero-lateral margin is sharp, slightly curled and elegantly striated or milled: the edge of the subhepatic regions, or pterygostomial ridges, are extremely prominent, standing out on either side like a pair of little wings. In the male the posterior margin bears a petaloid tubercle at either end and a denticle in the middle line: in the adult female the lateral tubercles are indistinct and the median tubercle absent.

The front is emarginate, and part of the edge of the buccal cavern can be seen beyond it in a dorsal view.

On the carapace are three broad granular ribs which unite to form a "broad-arrow," point forwards: the middle ridge begins about the middle of the gastric and ends in the middle of the intestinal region, the lateral ribs run obliquely backwards and outwards, parallel with the antero-lateral margins, across the branchial regions, their ends projecting well beyond the postero-lateral borders in the male, but not so much in the female.

The chelipeds are about half again as long as the carapace: the arm is trigonal with the edges raised and granular: the wrist and hand have a raised row of granules along the inner edge of their upper surface: the hand is about two-thirds as broad as long, and the fingers are about two-thirds the length of the hand.

The abdomen of the male consists of only two pieces, and is without a denticle.

Colours in spirit: mottled dark green and greenish brown, legs and chelipeds with black-speckled cross-bands.

Length of carapace of male 5 millim. long, 4.5 millim. broad; of ovigerous female 6 millim. long, 5.75 millim. broad.

*Loc.* Karáchi.

As in *Ebalia erosa* the space between the lower edge of the orbit and the edge of the buccal frame is much reduced. This species appears to be closely related to *Ebalia hypsilon*, Ortmann, in Semon's Zool. Forschungreisen Austral. u. Malay. Arch., Crust. p. 36, pl. ii. fig. 7.

### 32. *Ebalia erosa*, (A. Milne Edwards).

*Phlyxia erosa*, A. Milne Edwards, Journ. Mus. Godeff. I. iv. 1873, p. 262, and Nouv. Archiv. du Mus. X. p. 47, pl. iii. fig. 2: Haswell, P. L. S. N. S. Wales, IV. 1879, p. 54, and Cat. Austral. Crust. p. 125: Miers, P. Z. S. 1884, pp. 10, 13.

*Ebalia erosa*, Miers, 'Challenger' Brachyura p. 305: Ortmann, Zool. Jahrbuch. Syst., etc., VI. 1892, p. 580.

Carapace longer than broad, somewhat piriform, with a produced narrow bidentate front from which a prominent ridge runs straight back to the cardiac region, with the hepatic and subhepatic regions angularly prominent, and with three dentiform projections—one of which is the acuminate tip of the tumid intestinal region—on the prominent posterior margin. On the posterior half of the carapace there are some large symmetrically disposed tubercles, usually about 9 in number (3 on either branchial region and 3 on the cardiac region) and sometimes more or less confluent: the three on the cardiac region are always very distinct and are so connected as to form an elegant V, or with the ridge from the front an "anchor," and however much the branchial tubercles may be confluent one on either side of the V is

always enlarged and acuminate. The tubercles, the tumid intestinal region, and sometimes also the intervening hollows, are crisply granular.

The buccal cavern is elongate.

The chelipeds in both sexes are little longer than the carapace, and are rather slender: they are finely granular, especially the arms. The hand is a little broader at its proximal than at its distal end, where it is about half as long as broad: the fingers are little more than half the length of the hand.

Colours in spirit ivory white.

The carapace of the male is about 6 millim. long and 5 millim. broad: that of the adult female is 9 millim. long and 7 millim. broad.

Numerous specimens are in the Indian Museum, from the Maldives and Andamans.

### *Nucia*, Dana.

*Nucia*, Dana, U. S. Expl. Exped., Crust. pt. I. p. 397.

*Nucia*, Bell, Cat. Leucos. Brit. Mus. p. 24.

Carapace strongly convex, broad, transversely somewhat ovoidal in shape, its surface uneven and densely covered with vesiculous or pustulous granules, and with the regions usually well demarcated.

The front is narrow, broadly bidentate, and somewhat sunk behind the level of the front edge of the buccal cavern. The pterygostomian regions are puffed out so as to increase the squat and sunken appearance of the front. There is a remarkably broad interval between the orbits and the edge of the buccal cavern.

The eyes are large, and the orbits have the upper edge deeply emarginate so that the retracted eye is hardly at all concealed. The antennules fold obliquely, and the antennæ have the basal joint rather closely filling the gap at the inner canthus of the orbit and the flagellum small but distinct.

The buccal cavern is moderately elongate: the exognath is not dilated and has the outer border almost straight: the triangular merus of the endognath is not much shorter than the ischium measured along its inner edge.

The chelipeds are very short and stout: the legs also are remarkably stout.

In the Indian Museum Collection, the only representative of this genus is a male specimen of *Nucia speciosa*, Dana, from Upolu. This is, quite clearly, closely allied to the species named *Randallia pustulosa* and *Randallia lamellidentata* by Wood-Mason. [Whether these are really *Randallia* as defined by Stimpson it is difficult to say; but they are certainly congeneric with Miers' *Randallia granulata* ('Challenger' Brachyura, p. 317, pl. xxvi. fig. 1)].

33. *Nucia pfefferi*, (de Man).

*Ebalia pfefferi*, de Man, Archiv. für Naturges. LIII. 1887, i. p. 390, pl. xvii. fig. 4: Henderson, Trans Linn. Soc., Zool., (2) V. 1893, p. 402.

As there seems to be some doubt whether this species is really distinct from *Nucia speciosa*, Dana, U. S. Expl. Exp. Crust. pt. I. p. 397, pl. xxv. fig. 5a I must here be content to give only the references. It is included in the Indian fauna on the authority of Dr. J. R. Henderson.

*Randallia*, Stimpson.

*Randallia*, Stimpson, Journal Boston Soc. Nat. Hist. Vol. VI. 1857, p. 471.

*Randallia*, Miers, 'Challenger' Brachyura, p. 316.

Carapace circular and convex, almost globular; with the front narrow, usually broadly bidentate, and somewhat sunk behind the level of the front edge of the buccal cavern. The subhepatic or pterygo-stomian regions are convex and puffed out, so as to increase the squat and sunken appearance of the front. There is a remarkably broad vertical interval between the orbits and the edge of the buccal cavern.

The surface of the carapace is, typically, covered with vesicular or pustulous granules, but these are sometimes visible only with a lens: the regions are usually, but not always, distinctly demarcated by grooves.

The posterior margin is generally, but not always, armed with spines or petaloid lobules or tubercles.

The orbits are almost as imperfect as they are in *Parilia*: their upper edge is deeply emarginate, there is a wide gap at the inner canthus, and there are three very distinct sutures, or sometimes actual fissures, in the upper-outer wall.

The antennules fold obliquely: in one Indian species their basal joint forms a close-fitting operculum to the antennulary fossa. The antennæ are very distinct, and are loosely lodged in the inner canthus of the orbits.

The buccal cavern is triangular and somewhat elongate: the exognath is not dilated and its outer margin is almost straight: the triangular merus of the endognath is about  $\frac{2}{3}$  the length of the ischium measured along its inner edge.

Chelipeds either massive or moderately stout, of moderate length; fingers stout, about as long as the hand, which is not more—but is usually much less—than half the length of the carapace.

Although there is, as usual, some fusion among the abdominal terga, yet the sutures are never wholly obliterated as they are in most other Leucosines.



Key to the Indian species of *Randallia*.

- I. The basal joint of the antennules forms a close-fitting operculum to the antennular fossa : the whole body and appendages are covered with a dense velvety pubescence : front very indistinctly emarginate ..... *R. lanata*.
- II. The antennules fold loosely in their fossæ : body and appendages devoid of pubescence : front distinctly bidentate :—
  1. Carapace granulous or pustulous, the regions defined by grooves :—
    - i. Front separated from the carapace by a conspicuous transverse groove : intestinal region tumid but not culminating in a spine : tip of exognaths (and often of adjoining points) blister-like ..... *R. pustulilabris*.
    - ii. No deep groove at the base of the front : intestinal region culminating in a spine, the tip of which overhangs the posterior margin of the carapace : end of exognaths sharp :—
      - (a) Chelipeds rather elongate and slender, twice the length of the carapace : hand subcylindrical and rather elongate : antero-lateral margins of carapace with simple tubercles or spines ..... *R. pustulosa*.
      - (b) Chelipeds short and stout, less than twice the length of the carapace : hand short and stout, its outer border, like that of the fingers, very sharply cristiform : antero-lateral margins of carapace with laminiform teeth ..... *R. lamellidentata*.
  2. Carapace smooth and polished to the naked eye, the regions not or hardly defined :—
    - i. Chelipeds rather elongate and slender, more than twice the length of the

- carapace: three round lamiiform lobes on the posterior margin of the carapace ..... *R. eburnea*.
- ii. Chelipeds short and stout, less than twice the length of the carapace: posterior margin of carapace differing from that of all the other species in being quite smooth ..... *R. glans*.

34. *Randallia lanata*, n. sp.

The whole of the body and its appendages covered with a close, short, light-coloured, velvety pubescence.

Carapace circular, globular, with all the regions well defined by grooves; its surface covered, beneath the pubescence, with rather distant pustulous granules. Behind the front all the margins of the denuded carapace are armed with blunt dentiform tubercles or granules. There is a not very distinct notch between the hepatic and branchial regions.

The front has an almost straight edge, and although it is for the genus rather prominent, the ends of the external maxillipeds can be seen beyond it in a dorsal view.

The orbits are so emarginate above as to afford little concealment to the retracted eye, which is rather large.

The antennules fold obliquely, their basal joint forming a close-fitting operculum to the antennulary fossæ.

The chelipeds are similar in both sexes, being stout and about half again as long as the carapace: the hand is very stout, is not much longer than broad, and is about one-third the length of the carapace: the fingers are stout and are about three-fourths the length of the hand. The legs are stoutish.

In both sexes all seven abdominal terga are plainly and independently recognizable though not all independently movable: in the female (even in the ovigerous adult) the abdomen is somewhat narrow.

In the adult male the carapace is 7 millim. long and 6.5 millim. broad, in the adult female it is 8.5 millim. in both diameters.

Andaman Sea usually at over 30 fathoms.

35. *Randallia pustulilabris*, n. sp.

*Leucosilia granulosa*, Alcock and Anderson, J. A. S. B. Vol. LXIII. pt. 2, 1894, p. 207, and Ill. Zool. Investigator, Crustacea, pl. xxiv. fig. 3 (*in the press*).

Carapace slightly broader than long, globular: truncated anteriorly,

so that the external maxillipeds are visible beyond the front: very densely covered, as are also the chelipeds, with bead-like granulations: the regions delimited by shallow yet distinct furrows. The rostrum consists of two divergent hollow lobes, the tips of which are curved slightly outwards, beneath which the antennules are lodged, as in the other species of this genus: *immediately behind the rostrum the carapace is traversed from side to side by a deep groove*. The antero-lateral margin is interrupted by a deep notch, in front of which is a coarse blunt hepatic tooth, while behind it is a stronger epibranchial tooth. The lateral angle is also marked by a prominent granule. The posterior margin is almost straight and bears three dentiform tubercles, of which the median is hardly conspicuous. The hepatic regions are inflated, as are also the sides of the gastric region. The intestinal region forms a tumid boss, on the summit of which the granulations are obsolescent.

The tips of both rami of the densely granular external maxillipeds are strongly bent upwards, as in all the other species of this genus, that of the exognath ending in a large blister-like tubercle. [Sometimes also the outer angles of the buccal cavern, the tips of the frontal teeth, and the edges of the orbit end in similar, but smaller, blister-like swellings].

The chelipeds in the male are a little less than twice the length of the carapace, and are stout: the fingers are stout, and are about as long as the hand, which is rather more than two-fifths the length of the carapace. Legs smooth: dactyli with a few hairs.

The 3rd to the 5th abdominal terga are fused in the male, but are independently recognizable, and the 6th has a terminal denticle—not very conspicuous: in the female the 3rd to the 6th are fused.

	Male.	Female.
Length of carapace.....	6.5 millim.	7.5 millim.
Breadth of carapace.....	7.0 millim.	9.0 millim.
Greatest span (of chelipeds).....	24.0 millim.	26.5 millim.

Besides being smaller, and having the chelipeds of slightly greater relative length, the male differs from the female in being much more sharply granular.

Numerous males and egg-laden females, from different parts of the Malabar Coast in 26–30 fathoms, from the North Maldivé Atoll in 15–30 fms., and from Mergui in 40 fms.

I have thought it justifiable to change the name of this species from *granulosa* to *pustulilabris*, as Miers, 'Challenger' *Brachyura* (1886) p. 317 has already used the very similar name *granulata* for a species belonging to this genus as here defined.

36. *Randallia glans*, n. sp.

Carapace globular, usually in the male smooth and polished to the naked eye though closely punctate-granular under the lens, in the female densely covered with vesicular granules that are often visible without any magnification: all its borders smooth and full, and except for a broad and shallow notch in the antero-lateral border, between the branchial and hepatic regions, its regions are not in any way defined.

Front narrow, broadly bidentate, the tips of the teeth somewhat produced and bent outwards: its base is separated from the rest of the carapace by an indistinct groove.

External maxillipeds smooth and polished to the naked eye in the male, somewhat more granular in the female—just like the carapace.

Chelipeds stout: in the male a little less than twice the length of the carapace, everywhere very densely granular, the granules being vesicular and being plainly visible without a lens on the arm at any rate: fingers stout, as long as the hand, which is between  $\frac{1}{2}$  and  $\frac{2}{3}$  the length of the carapace. Legs smooth: dactyli with a few hairs.

In the male the 3rd-5th abdominal terga are fused but are independently recognizable, and the 6th has a strong terminal denticle; in the female the 3rd-6th are fused.

The carapace of the adult male is 6 millim. in either diameter, that of the ovigerous female is 7.5 millim. long and 8 millim. broad.

Andaman Sea, about 50 fms.

This species is closely related to *R. pustulilabris*.

37. *Randallia lamellidentata*, Wood-Mason.

*Randallia lamellidentata*, Wood-Mason, Illustrations of the Zoology of the 'Investigator' Crustacea, pl. v. figs. 5, 5a, 5b: Alcock, Ann. Mag. Nat. Hist. May, 1894, p. 404.

Carapace rhomboidal with the angles rounded off—subcircular; its surface behind the front covered with unequal-sized rather scattered pustulous tubercles; its regions well defined by grooves of some depth.

Front bluntly bidentate. On the antero-lateral margin are three broad lamelliform teeth, the front one of which is on the pterygostomian ridge (which as usual forms the front part of the antero-lateral margin), and there is a fourth similar tooth at the junction of the antero-lateral and postero-lateral margins. The postero-lateral margins are full and the pustulous tubercles extend on to them.

The short posterior margin is elegantly bilobed, with a few pearly granules round the lobes, and is overhung by the tip of the horizontal spine in which the intestinal region culminates.

The ventral surface of the carapace, the thoracic sterna, abdominal

terga (in the male) and external maxillipeds are all granular, the granules above the base of the chelipeds being enlarged and pearly.

The chelipeds in the male are about two-thirds as long again as the carapace, and are massive and granular: at the distal end of the outer edge of the somewhat trigonal arm the granules are enlarged and almost spiniform, as are also one or two at the distal end of the outer surface of the wrist. The hand is not much longer than broad and hardly one-third the length of the carapace; its outer edge is in the form of a remarkably thin and deep crest: the fingers are stout and rather longer than the hand, their outer (non-opposed) edges are cristiform.

The legs are granular, the granules on the dorsum of the propodites carpopodites and distal end of the meropodites being spiniform, as also on the outer surface of the ischium and merus of the last pair: the dactyli are hairy.

The 3rd-6th abdominal terga of the male are fused but are all very distinctly and independently recognizable, the 6th has a terminal denticle.

The largest male, dredged in the Andaman Sea at 350 fms., has the carapace between 16 and 17 millim. long and 18 millim. broad (without spines).

### 38. *Randallia pustulosa*, Wood-Mason.

*Randallia pustulosa*, Wood-Mason, Ann. Mag. Nat. Hist. March, 1891, pp. 266 and 267, and Illustrations of the Zoology of the 'Investigator' Crustacea, pl. v. fig. 4.

Carapace subcircular, subspherical; covered with unequally large pustulous tubercles the surface of which, like the surface between them, is finely and closely granular under the lens; all the regions are well defined by broad grooves.

The front is narrow and broadly bidentate. The lateral margins are full and inflated, and carry in the adult a series of tubercles, in the young a series of blunt spines: in the antero-lateral margin, between the hepatic and branchial regions, is a conspicuous notch, which corresponds with a groove or depression in the pterygostomian face of the carapace.

The short posterior border has a spine or dentiform lobe at either end, and is overhung by the long spine in which the tumid intestinal region culminates.

The whole under surface is densely granular in the young male, but in the female the fused 4th-6th abdominal terga and the inner half of the ischium of the external maxillipeds are smooth.

The chelipeds in the adult female and young male (adult male unknown) are twice the length of the carapace and are everywhere

finely granular. The hand is subcylindrical and elongate, being half as long as the carapace; the fingers are stout and about as long as the hand, they are finely denticulate, with enlarged denticles at regular distant intervals.

The legs are stoutish and, to the naked eye, smooth: the dactyli are fringed with hairs.

In the (young) male the 3rd-6th abdominal terga are fused but without any obliteration of sutures: in the adult female the 4th-6th are fused and the sutures obliterated.

Carapace of an adult female about 31 millim. in either diameter.

Loc. Andaman Sea, 240-220 fms., and 250 fms., Laccadive Sea, 406 fms.

In the young the carapace is quite spherical, with its edges spiny and its surface closely and crisply granular—the young, in short, has a very strong general resemblance to the adult of *R. pustulilabris*.

In the adult female the brood-pouch communicates with the branchial chambers on either side by means of a foramen, as in *Parilia*.

### 39. *Randallia eburnea*, n. sp.

Carapace subcircular, convex, subspherical, perfectly smooth to the naked eye though closely covered with vesicular granules under the lens; its regions, except the intestinal, hardly defined.

The front is narrow, and is broadly bidentate; the edge of the buccal cavern is more prominent beyond it than in any of the other species. Between the convex subhepatic border and the branchial border is a broad notch: near the middle of the branchial border is a rounded deflexed tooth: the antero-lateral margin from the front to this tooth is finely denticulate.

The fissures in the outer wall of the orbit are very distinct.

The posterior margin is elegantly three lobed, the lateral lobes being broad and semicircular, the middle lobe being narrower: all three are laminar.

The external maxillipeds are granular and pubescent distally.

The chelipeds are longer and more slender than in any of the other species, being a little more than  $2\frac{1}{2}$  times the length of the carapace: they are perfectly smooth to the naked eye though closely granular under the lens, the granules on the arms being vesicular. The hands are subcylindrical and about two-thirds the length of the carapace: the fingers are stout and between  $\frac{2}{3}$  and  $\frac{3}{4}$  the length of the hand, their opposed edges are finely denticulate, with enlarged denticles at distant regular intervals. Legs smooth, the dactyli with a few fine hairs at tip only.

Although the 3rd-5th abdominal terga are fused they are all three independently recognizable.

Carapace of (apparently adult) male 14 millim. in either diameter.

*Loc.* Off Laccadive Islands, 30 fms.

#### *Parilia*, Wood-Mason.

*Parilia*, Wood-Mason, Ann. Mag. Nat. Hist., March 1891, p. 264.

Carapace strongly convex, especially posteriorly, somewhat oval transversely, with three spines on the posterior margin; the surface finely granular, the regions fairly well-defined.

The front is narrow and bidentate, and the epistome projects well beyond it,—the epistome being, for an Oxystome, deep—as in *Randallia* and *Nucia*.

The eyes are small, and the orbits imperfect, for not only have they two fissures (not mere sutures) in the roof, and a broad fissure in the outer wall, and a broad gap communicating with the antennary and antennular fossæ, but their upper-outer wall is deeply emarginate.

The antennules fold a little obliquely. The antennæ are distinct, and stand in the gap at the inner canthus of the orbit, which they do not nearly fill.

The buccal cavern is considerably broader than long, owing to the enormous width of the afferent branchial channels and of the foliaceous expansion of the exopodite that covers them: the outer edge of the latter is strongly curved: the triangular merus of the endognath is very nearly as long as the ischium, measured along the inner edge.

The chelipeds in the adult male are several times the length of the carapace, and are slender, though more massive than the legs: the hands are several times the length of the stoutish fingers.

The abdomen in the male consists of five distinct pieces: in the female it consists of seven, but the 4th, 5th and 6th are not separately movable.

Branchial chambers greatly inflated, especially posteriorly: branchiæ large, and six in number on either side. [Brood-pouch of the female very large and communicating with the branchial chamber on either side, at base, by a foramen.]

#### 40. *Parilia alcockii*, Wood-Mason.

*Parilia alcockii*, Wood-Mason, Ann. Mag. Nat. Hist., March 1891, p. 264, and Ill. Zool. 'Investigator,' Crust. pl. v. figs. 3, 3a ♀: Alcock and Anderson, J. A. S. B. Vol. LXIII. pt. 2, 1894, p. 177.

Carapace about seven-eighths as long as broad, transversely oval,  
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but with the anterior margin—between the outer angles of the afferent branchial channels—perfectly straight.

The antero-lateral margin is broadly indented at the junction of the hepatic and branchial regions, and bears four denticles; and there are three denticles on the posterior margin, the middle one of which is the smallest: just above the posterior margin is another transverse row of three denticles,—one in the middle of the intestinal region and one on the posterior wall of the branchial region on either side.

The carapace is strongly convex, the convexity gradually increasing from before backwards and then suddenly dropping, like a simian cranium, which in profile it much resembles: the surface is everywhere finely granular.

The regions of the carapace are well delimited by broad shallow grooves and lines of dimples, the branchial regions each forming an enormous tumid expanse. A slightly raised ridge traverses the carapace, in the middle line, from the base of the front to the intestinal denticle.

The front is broadly bilobed, each lobe being convex dorsally and acuminate: beyond it in a dorsal view is seen the epistome and the whole length of the edge of the buccal cavern.

The surface of the external maxillipeds and the ventral surface of the carapace are finely granular, but the sternum and the greater part of the abdomen are smooth. In the middle of the sternum of the female, between the genital openings, is an erect spine.

The external maxillipeds have a narrow triangular endopodite, the merus of which is strongly curved upwards towards the front; and a foliaceous exopodite, which is much shorter than the endopodite, and which is semicircular in shape and two-thirds as broad as long—broader even than in *Philyra globosa*, Fabr.

The chelipeds as in *Myra fugax*, vary according to age and sex: in the adult male they are  $4\frac{1}{2}$  times, in the female and young male  $2\frac{1}{2}$  times, the length of the carapace, and are only about twice as massive as the legs: their surface up to nearly the end of the hand is finely scabrous. The arm is cylindrical: the hand in the female is cylindrical, but in the male somewhat clavate. The hand in the male is more than 3 times, in the female only twice the length of the fingers: the fingers are stout, gently curved in the female, somewhat sinuous in the adult male, and their opposed edges are almost edentulous.

The legs in the male are shorter than the arm; in the female they are a little longer than the arm: they are cylindrical, and finely scabrous on the dorsal surface: the dactyli are obtusely pointed, and have both their edges closely fringed with longish stiff hairs.



Colours in spirit rusty reddish.

The carapace of the average adult male is 50 millim. long and 56 millim. broad, of the adult female 40 millim. long and 48 millim. broad.

Fairly common on soft muddy bottoms along the east coast of India between 70 and 250 fathoms.

In the Indian Museum collection are 96 specimens of both sexes and all ages.

*Myra*, Leach.

*Myra*, Leach, Zool. Miscell. III. p. 23.

*Myra*, Milne-Edwards, Hist. Nat. Crust. II. 125.

*Myra*, Bell, Trans. Linn. Soc. Vol. XXI, 1855, p. 296, and Cat. Leucos. Brit. Mus. p. 12.

*Myra*, Miers, 'Challenger' Brachyura, p. 312.

? *Myropsis*, Stimpson, Bull. Mus. Comp. Zool. Vol. II. p. 156.

Carapace ovoid (or globular in *Myropsis* and in the young of most Indian species of *Myra*), terminating posteriorly in three spines,—two on, and one in the middle line immediately above, the posterior border. (But in *Myropsis* and in the young of several species of *Myra* there is a pair of additional spines,—one on either postero-lateral border just above the last pair of legs). The surface of the carapace is either smooth or granular, never nodular or eroded, and resembles that of *Leucosia* in not having all the regions demarcated, at any rate in the adult.

The front is well delimited from the carapace, and although the dentiform prolongations of the septa of the branchial channels may sometimes project beyond it, yet the whole of the edge of the buccal cavern is never in the adult seen beyond it in a dorsal view.

The hepatic region—the side-wall of which commonly forms a distinct facet—is generally separated from the branchial region by a broad notch in the antero-lateral margin, this being continuous with a depression in the pterygostomial face of the carapace and with a longitudinal groove in the side-wall of the carapace,—the whole foreshadowing the thoracic sinus of *Leucosia* (? in *Myropsis*).

The orbits are deep, and although the upper edge is a little emarginate, the retracted eye is completely concealed: the three sutures in the roof and outer wall are very distinct: as in *Leucosia* the floor practically coincides with the roof of the buccal cavern, as regards its edge at any rate.

The antennæ are loosely lodged in a gap at the inner canthus of the orbit. The antennules fold obliquely.

The buccal cavern is elongate: the acutely-triangular merus of

the external maxillipeds is not much more than half the length of the ischium measured along the inner edge: the 2nd segment of the exognath generally has the outer edge elegantly curved, but is not dilated except a little at the base.

The chelipeds though much more massive than the legs, and rather more massive than those of *Illa*, *Arcania* and their immediate allies, are not nearly so massive as those of *Leucosia*, *Philyra*, etc. In some species at any rate they vary much in length according to age and sex, but they are seldom less, and are often more, than twice the length of the carapace. The fingers are stout and vary in length, being sometimes a little longer than, but in the adult males of one species only half the length of, the hand.

The abdomen of the male usually consists of 4 pieces, that of the female of 5.

The species of this genus are often difficult to discriminate owing to the changes that they undergo in growth. The following key will, it is believed, serve for the determination of adult forms.

*Key to the Indian species of Myra.*

I. Carapace broadly oval (longitudinally), with a broad notch in the antero-lateral margin between the hepatic and branchial regions:—

1. Side-wall of hepatic region forming a distinct facet, behind which the lateral margins of the carapace are defined by a beaded line: spines of the posterior margin more or less acute: fingers either shorter or hardly longer than the hand:—

i. Spines of the posterior margin long and acute: carapace finely granular—the granules hardly visible to the naked eye: chelipeds slender (in the adult male nearly thrice the length of the carapace): hand long (in the adult male often nearly twice the length of the fingers, and about two-thirds the length of the carapace) ...

*M. fugax.*

ii. Spines of the posterior margin short, the middle one acute,

those on either side dentiform :  
carapace crisply granular, the  
granules of good size: cheli-  
pedes stoutish, not quite twice  
the length of the carapace even  
in the adult male: hand short:—

- a. Front not projecting be-  
yond the dentiform  
ends of the walls of  
the branchial channels:  
hand about half length  
of carapace: fingers  
about two-thirds length  
of hand ..... *M. affinis*.
- b. Front shaped much as  
in *Leucosia*, projecting  
well beyond the free  
edge of the branchial  
channels: hand hardly  
two-fifths the length of  
the carapace: fingers  
as long as the hand ..... *M. brevimana*.
2. Side wall of hepatic regions convex, not  
distinctly faceted in the adult: later-  
al margins of the carapace full, and  
not defined by any beaded line: arma-  
ture of the posterior margin consist-  
ing of three petaloid lobules: fingers  
longer than the hand ..... *M. darnleyensis*.
- [ II. Carapace subcircular, with five marginal spines  
and spinules at its posterior end ..... *M. pentacantha*.  
(probably the  
young of *M.*  
*fugax*)].
- III. Carapace narrowly and acutely oval (longitu-  
dinally) its shape recalling that of *Raninoides*,  
without any marked notch between the hepatic  
and branchial regions ..... *M. elegans*.

#### 41. *Myra fugax*, (Fabr.)

*Cancellus anatum tertius*, Rumph, Amboin. Rariteitk. I. 27, pl. x. fig. C.  
*Cancer punctatus*, Herbst, Krabben, I. ii. 89, pl. ii. figs. 15, 16.

*Leucosia fugax*, Fabricius, Ent. Syst. Suppl. p. 351: Bosc, Hist. Nat. Crust. I. 236: Latreille, Hist. Nat. Crust. et Ins. VI. 119, pl. l. figs. 1, 2

*Myra fugax*, Leach, Zool. Miscell. III. p. 24: Desmarest, Consid. Crust. p. 169, pl. xxviii. fig. 2: Milne Edwards, in Cuvier, Règne Animal, Crust. pl. xxv. fig. 3, and Hist. Nat. Crust. II. 126: De Haan, Faun. Japon. Crust. p. 134, pl. xxxiii. fig. 1: Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 293, and Cat. Leucos. Brit. Mus. p. 12: Stimpson, Proc. Acad. Nat. Sci. Philad. 1858, p. 160: A. Milne Edwards, Nouv. Archiv. du Mus. X. 1874, p. 45: Hilgendorf, MB. Ak. Berl. 1878, p. 811: E. Nauck, Zeits. Wiss. Zool. XXXIV. 1880, p. 48 (*gastric teeth*): Richters, in Möbius Meeresf. Maurit. p. 157: Miers, P. Z. S. 1884, pp. 10, 13, and 'Challenger' Brachynura p. 313: [Cano, Boll. Soc. Nat. Napoli, III. 1889, p. 253]: Müller, Verh. Ges. Basel, VI. 1886, p. 472: Ortmann, Zool. Jahrbuch, Syst., &c., VI. 1892, p. 581: J. R. Henderson, Trans. Linn. Soc. Zool., (2) V. 1893, p. 402. (Adult).

*Myra carinata*, Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 297, pl. xxxii. fig. 3, and Cat. Leucos. Brit. Mus. p. 13: Haswell, P. L. S., N. S. Wales, IV. 1879, p. 50, and Cat. Austral. Crust. p. 121: Miers, Ann. Mag. Nat. Hist. (5) V. 1880, p. 316, and Zoology H. M. S. 'Alert' pp. 184, 250: Smiter, Tijds. Nederl. Ind. XL. 1881, p. 160: Müller, Verh. Ges. Basel, VIII. 1886, p. 472: A. O. Walker, Journ. Linn. Soc., Zool., XX. p. 111. (Non-adult).

*Myra coalita*, Hilgendorf, MB. Ak. Berl. 1878, p. 812, pl. i. figs. 6 and 7: [Cano, Boll. Soc. Nat. Napoli, III. 1889, p. 253]. (Non-adult).

*Myra dubia*, Miers, P. Z. S. 1879, pp. 20, 42.

*Myra fugax*, var. *coalita*, Ortmann, Zool. Jahrbuch., Syst., &c., VI. 1892, p. 582.

Carapace, in the adult, ovoidal, with 3 sharp, usually recurved, spines—one at either extremity of the posterior margin, and one very long one in the middle line just above the posterior margin. On the surface of the carapace are (1) some scattered punctiform granules, almost invisible to the naked eye in the adult (except on the basal half of the median posterior spine where they are always large and numerous), and (2) a longitudinal median carina, almost or quite obsolete in the adult. The regions of the carapace are not well defined.

The front is broadly bidentate, and is prominently convex dorsally, but projects so little beyond the edge of the buccal cavern that the spiniform angles of the branchial channels and the tips of the external maxillipeds can be seen beyond it in a dorsal view: it and the neighbouring parts are usually somewhat pubescent.

Behind the tip of the front the antero-lateral boundary of the carapace is formed by the obliquely-facetted side-wall of the sub-hepatic region, the facet being bounded above and below by beaded lines on both of which, near their posterior end, is a tubercle or tooth: the surface of the facet is quite smooth.

Behind the hepatic facet, between it and the branchial region, is a very well defined notch corresponding with a depression on the pterygostomian face, this again being in continuity with a well-cut longitudinal groove (quite independent of the epimeral suture) that traverses

the side-wall of the carapace just above the somewhat thickened epimeral edge,—the whole foreshadowing the thoracic sinus of *Leurosia*.

Behind this notch the lateral border of the carapace is defined by a finely beaded line, the first few beads being sometimes, in non-adults, somewhat dentiform.

The external maxillipeds are granular and hairy distally, and in the female are hairy all along their apposed edges.

The chelipeds vary a good deal according to age and sex, but are always rather slender. In the adult male they are from  $2\frac{3}{4}$  to  $3\frac{1}{4}$  times the length of the carapace (without spine), in the adult female a little over twice. The cylindrical arm has the proximal half to three-quarters closely covered on all but its under surface with enlarged vesicular granules. The hand though slightly broadened at base, is of an elongate rather slender form: in the adult male it is about  $\frac{2}{3}$  the length of the carapace (without spine), in the adult female half or a little more than half. The fingers in the adult male are from  $\frac{1}{8}$  to  $\frac{1}{2}$ , in the adult female about  $\frac{2}{3}$ , the length of the hand: they are gently curved, a little bent inwards, and somewhat slender, and their opposed edges meet throughout and are finely denticulate, with larger denticles at regular rather distant intervals.

The legs are slender and not, or hardly, longer than the arm; their dactylus is narrowly lanceolate and fringed with longish stiffish hairs, as is also the dorsal edge of the propodite.

On the long penultimate piece of the male abdomen is a terminal granule.

Colours in spirit: pinkish flesh-colour, the chelipeds and legs copery, the front and branchial regions often with a bluish tinge.

The largest adult male in the Indian Museum collection has the carapace 28 millim. long (without spine) and 23 millim. broad.

Found on both coasts of the Peninsula, at the Andamans, and in the Persian Gulf.

In the Indian Museum there are 57 specimens, including numerous adults of both sexes.

[ *Myra pentacantha*, n. sp. ? ]

Most probably the young of *M. fugax*.

Differs from *Myra fugax* Fabr. in the following characters:—

(1) the carapace is almost circular, and is somewhat depressed, except in the middle line where it is strongly carinated:

(2) the front is thickly pubescent, and the whole of the free edge of the buccal cavern is visible beyond it in a dorsal view:

(3) the intestinal region is well defined and rather tumid, and is

surmounted in the middle line by a raised cluster of granules, terminating, but discontinuous with, the carina of the carapace :

(4) in addition to the 3 spines on the posterior margin of the carapace there is a spine or spinule on either postero-lateral margin above the last pair of legs :

(5) on the antero-lateral margin, immediately behind the branchio-hepatic notch, are several denticles.

The chelipeds are not quite twice the length of the carapace : they are slender, and their constituent pieces have the same proportions as in the adult female of *M. fujax*.

The carapace of an average specimen is 8.5 millim. long and 8 millim. broad.

In the Indian Museum are 29 specimens from both coasts of the peninsula. Commonest at about 25 fathoms.

I regard these as the very young of *M. fujax* first because among 57 specimens of that species in the Indian Museum there is not a single very young one, and secondly because a fine large adult male of that species in our collection has the additional spine well developed on one side. Again it is suggestive that although *M. pentacantha* appears to be a common enough form, it is never found as an adult. ]

#### 42. *Myra affinis*, Bell.

*Myra affinis*, Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 296, pl. xxxii. fig. 2, and Cat. Leucos. Brit. Mus., p. 12 : Stimpson, Proc. Ac. Nat. Sci. Philad. 1853, p. 160 : Haswell, P. L. S. N. S. Wales, IV. 1879, p. 50, and Cat. Austral. Crust., p. 121 : Miers, Zool. H. M. S. 'Alert' pp. 184, 159, and 'Challenger' Brachyura, p. 315 : A. O. Walker, Journ. Linn. Soc., Zool., XX. 1890, p. 111.

*Myra manillaris*, Miers (*nec* Bell), Miers, Trans. Linn. Soc. (2) I. 1875-79 (1877) p. 239, pl. xxxviii. figs. 25-27, and 'Challenger' Brachyura, p. 315.

*Myra subgranulata*, Kossmann, Reise roth. Meer. Crust., p. 65, pl. i. fig. 7, and Archiv. für Naturg. XLIV. 1878, p. 256.

? *Myra australis*, Haswell, Proc. Linn. Soc. N. S. Wales, IV. 1879, pp. 50 and 404, pl. v. fig. 3, and Cat. Austral. Crust., p. 122 : Miers, Zool. H. M. S. 'Alert' pp. 184, 251, and 'Challenger' Brachyura, p. 315 : A. O. Walker, Journ. Linn. Soc. Zool., XX. 1890, p. 111 : J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 402.

*Myra punctata*, de Man, Journ. Linn. Soc., Zool., XXII. 1878, p. 205 (*nec synon*).

Differs from *Myra fujax*, adult males being compared, in the following characters :—

(1) the carapace, including the surface of the sub-hepatic facet, is covered with crisp granules, all very plainly visible to the naked eye ; its longitudinal median carina is persistent and granular ; its posterior marginal spines are shorter and blunter, the middle one being sharp and recurved, the lateral ones dentiform :

(2) the chelipeds are stouter and shorter, being a little less than twice the length of the carapace (without spine); the hand especially is stouter and shorter, being hardly half the length of the carapace; the fingers are about  $\frac{2}{3}$  the length of the hand:

(3) the long penultimate piece of the male abdomen carries a strong terminal tooth.

Colours in spirit: some reddish or orange markings on the carapace, and some broad orange-reddish cross-bands on the chelipeds.

The largest adult male in the Indian Museum collection has the carapace 17 millim. long and 15 millim. broad.

In the young the intestinal region is distinctly delimited, rather tumid, and is surmounted by a raised cluster of granules terminating, but discontinuous with, the median carina of the carapace.

In the Indian Museum collection are 16 specimens from Arakan, Mergui, Andamans, Ganjam coast, and the Persian Gulf.

The specimens here included comprise (1) adult forms that answer to Bell's descriptions and figures of *M. affinis* and are readily distinguishable from *M. fugax* (a) by the relative stoutness and shortness of the chelipeds and hands and (b) by the shortness and coarseness of the spines, and (2) half-grown forms that correspond with Haswell's figure of *M. australis*, and Miers' figures of *M. mamillaris* (*loc. cit.*) which Miers in his work on the 'Challenger' Brachyura refers to *M. australis*. Although Haswell's figure and description hardly correspond—e.g., the fingers are described as being about half the length of the hand, but are figured as nearly equal to the hand in length—I cannot but think that his species represents the immature form of *M. affinis*.

In very young specimens there is a denticle or enlarged granule on either postero-lateral margin above the last pair of legs.

#### 43. *Myra brevimana*, n. sp.

Differs from *M. fugax*, a large series of fully adult males and ovigerous females being compared, in the following characters:—

(1) the carapace is much more convex, being ovoid in the male, subglobular in the female; its surface, including the surface of the sub-hepatic facet, is crisply granular and its longitudinal median carina is persistent and granular, as in *M. affinis*; the posterior marginal spines are as in *M. affinis*, the middle one being short stout acute and recurved, the lateral ones being dentiform:

(2) the front is much more deeply and acutely bidentate, and otherwise is shaped much as in *Leucosia*, being strongly convex, being delimited from the hepatic regions on either side by a hollow, being well recurved upwards, and projecting so far that no part whatever of

the buccal frame or of the external maxillipeds can be seen in a dorsal view even in the deep incision between the frontal teeth :

(3) the tooth on the posterior part of the upper of the two lines that defines the hepatic facet is almost as large and prominent as that on the lower :

(4) the chelipeds are quite similar in both sexes, and are stout, especially the hand ; they are just under twice the length of the carapace (without spine). The hand is hardly two-fifths the length of the carapace (without spine), is more than half as broad as long, and is somewhat inflated ; the fingers are as long as the hand, the dactylus being plainly longer than the outer border of the hand :

(5) on the long penultimate piece of the male abdomen is a strong terminal tooth.

Colours in spirit : regions of carapace defined by broad orange-red markings, some broad orange-red cross-bands on chelipeds, one of which occupies the basal half or three-fourths of the fingers.

Carapace in the adult male 16 millim. long and 14 millim. broad, in the adult female 20 millim. long and 18 millim. broad.

In the Indian Museum are 34 specimens from Arakan, Mergui, Ganjam, and Ceylon, usually at depths of about 30 fathoms.

In the young the intestinal region is well defined and tumid, and is surmounted by a raised cluster of granules in a line with the median longitudinal carina.

The prominent front, the stout chelipeds, and the short inflated hands are characters by which this species is easily recognized.

#### 44. *Myra darnleyensis*, Haswell.

*Myra darnleyensis*, Haswell, Proc. Linn. Soc., N. S. Wales, IV 1879, p. 52, pl. v. fig. 4, and Cat. Austral. Crust. p. 122 : Miers, 'Challenger' Brachyura, p. 316.

Carapace sub-piriform, globous dorsally, the lateral margins full and inflated and not defined by any beaded line ; the surface very finely and closely granular (under the lens) ; the intestinal region fairly well defined, as are also the branchial regions posteriorly.

The three processes on the posterior margin are not spines, but broadly-laminar petaloid lobes.

The front is prominent, but the dentiform ends of the walls of the branchial canals can be seen beyond it in a dorsal view : it is deeply channelled in the middle line, dorsally, and has a fluted appearance : the outer wall of the orbit has the same elegantly fluted appearance, owing to the depth of the sutures and the convexity of the surfaces between the sutures.

Behind the front the side-wall of the hepatic regions is full and



convex, not flattened and distinctly faceted as it is in other species: it bears, however, a strong mammillary tubercle. As in the other species, there is a well-defined notch in the antero-lateral margin between the hepatic and branchial regions—the notch as usual being in continuity with a crease in the pterygostomial face, and this with a groove in the lateral wall of the carapace.

The external maxillipeds are granular and hairy distally, being alike in both sexes.

The chelipeds are alike in both sexes and are about twice the length of the carapace: all the surfaces of the arm in the greater part of its extent are vesicular-granular, but the granules are only just visible to the naked eye. The hand is short, about one-third the length of the carapace (without spine), and is somewhat inflated. The fingers are markedly longer than the hand, the dactylus being about half again as long as the outer border of the hand.

The long penultimate piece of the abdomen of the male carries a stout terminal denticle.

Colours in spirit much as in *M. brevimana*, the regions of the carapace being defined by broadish orange-red markings, and the chelipeds having some broad cross-bands of the same colour, but these never involve the fingers, which are white.

In the male the carapace is 13 millim. long (without spine) and 11 millim. broad, in the female 15 millim. long and 13 millim. broad.

In the Indian Museum are 52 specimens, including adult males and ovigerous females, from the Audamaus, Maldives, Palk Straits, and from off Ceylon 34 fms.

In many adult females, as in most young, there is in the middle of the carapace a cruciform constellation of 5 enlarged bead-like granules or denticles. In the young also the side wall of the hepatic region is not so much inflated and even shows traces of flattening, while the tumid intestinal region is surmounted by an enlarged granule, and on either postero-lateral margin (in the very young), just above the last pair of legs, is a denticle or enlarged granule.

#### 45. *Myra elegans*, Bell.

*Myra elegans*, Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 297, pl. xxxii. fig. 4, and Cat. Leucos. Brit. Mus. p. 13.

Carapace elongate-oval tapering to a long acute spine at the posterior margin, half again as long as broad without the spine, nearly twice as long as broad with the spine. On either side of the spine is a spinule situated at either extreme of the short posterior margin, and a little in advance of these, on either postero-lateral margin, just above the last pair of legs, is sometimes a sharp denticle.

The carapace is traversed longitudinally, from the middle of the gastric region, by a broadish granular carina, and there is an elongate patch of granules along the middle of either branchial region and a patch round and on the big posterior spine; otherwise the carapace is smooth.

The front is broadly bilobulate, each semi-circular lobule having a knife-edge, and although it projects beyond the margin of all parts of the buccal cavern, yet the hairy tips of the external maxillipeds can be seen beyond it in a dorsal view.

Behind the front the side wall of either sub-hepatic region forms a not very well marked hairy facet, behind which there is no well marked marginal notch as there is in the other species. The lateral margins of the carapace are well defined and beaded throughout.

The chelipeds are nearly similar in both sexes, being slender and short—only about  $1\frac{1}{2}$  times the length of the carapace (without spine): the upper surfaces of the cylindrical arm are covered with enlarged vesicular granules in the greater part of their extent, and the under surface at base only: the hand is short, hardly a quarter the length of the carapace (without spine): the fingers are almost one-fourth longer than the hand.

The legs are compressed, especially the carpopodites and propodites, the latter and the dactyli having hairy edges.

The long penultimate piece of the abdomen of the male has a terminal denticle.

The largest male in the Indian Museum has the carapace 12 millim. long and 8 millim. broad: in an apparently adult female the carapace is 15.5 millim. long and 10.5 millim. broad.

A young and two apparently adult males and an adult female from a muddy bottom, in 12 fms., off the Madras coast, and a young male from off the Arakan coast 13 fms., are in the Indian Museum. In the last mentioned the wrist and hand are elegantly fluted with lines of raised granules.

Although our female is not laden with eggs, I conclude that it is adult because it has the wide deep brood-chamber with the broad convex abdominal lid so familiarly found in the adult females of the *Leucosilæ*. Moreover the carapace is stained and worn as if it had not been renewed for a long time. *Myra elegans* is certainly not the young of any other Indian species.

#### LEUCOSIA, Fabr.

*Leucosia*, Fabricius, Ent. Syst. Suppl. p. 349.

*Leucosia*, Milne Edwards, Hist. Nat. Crust. II. 121.

*Leucosia*, Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 281, and Cat. Leucos. Brit. Mus., p. 5.

*Leucosia*, A. Milne Edwards, Nouv. Archiv. du Mus. X. 1874, p. 39.

*Leucosia*, Miers, 'Challenger' Brachyura, p. 322.

The whole exo-skeleton is of the consistence and appearance of glazed porcelain.

Carapace extremely convex, sub-circular or subrhomboidal to hexagonal in outline, perfectly smooth, with none of the regions—except sometimes the hepatic—defined: in front of the hepatic regions it is produced to form a sort of upturned snout, underneath the tip of which are found the minute eyes sunk in deep round complete orbits, the obliquely-folding antennules, and the minute antennæ lying below the antennules.

The lateral epibranchial angles of the carapace form on either side a distinct lobe, which is bent downwards towards the base of the chelipeds to form the eave of a deep sinuous depression in the side-wall of the carapace, known as the thoracic sinus.

The true postero-lateral margin of the carapace is ill-defined posteriorly, and the epimeral edge of the carapace—which practically takes the place of most of the postero-lateral margin—is greatly thickened and elegantly milled. These epimeral edges on either side are continuous with a finely-beaded crest that forms the posterior margin of the dorsum of the carapace; and below this posterior margin the carapace ends in a deflexed posterior wall.

The buccal cavern is elongate-triangular, and the front part of its side walls are coincident with the sides of the snout-like front of the carapace: the acutely-triangular merus of the external maxillipeds is about as long as the ischium, and the outer margin of the exognath is almost straight.

The chelipeds are symmetrical and, relatively to the legs, very massive; they are a little longer in the male than in the female, but are very rarely more than half again as long as the carapace: the margins and certain parts of the surfaces of the arms are ornamented with large polished pearly tubercles: the hands are usually short and broad and little longer than the fingers. The true legs are small.

The abdomen of the male consists usually of 4 pieces, but the two large middle pieces (which are formed of 5 terga) are sometimes fused, into one: the abdomen of the female also consists of 4 pieces usually, but the large oval third piece (which is formed of 4 terga) is sometimes fused with the second piece.

The so-called thoracic sinus of *Leucosia* is simply an invagination of the after part of the pterygostomial region and of the side-wall of the carapace, as may be seen by comparing cleaned carapaces with those of other *Leucosines*.

The invagination seems to be chiefly due to the pushing up of the epimeral margin against the resistance of the vault of the carapace — a pushing up which may be inferred from the position of what remains of the “epimeral suture.”

The origin of the thoracic sinus from such a simple invagination is very apparent in the isolated carapace of *Leucosia unidentata*. Here, viewed from the inside of the carapace, the thoracic sinus is seen as the convexity of a pocket; and, viewed from the outside, the mouth of the sinus shows as a ring of large granules or puckers resulting from invagination.

*Key to the Indian species of Leucosia.*

**A. NORMAL GENERA:** free edge of front projecting beyond the epistome: hands not foliaceous:—

**I.** Carapace conspicuously longer than broad, bluntly rhomboidal, quite devoid of definite pubescence, the thickened epimeral edge never visible in all its extent, dorsally, when the carapace is held, without any inclination, straight in front of the observer's eyes: front never ending in three sharp horizontal prongs: the thoracic sinus always defined in some part of its extent by large granules visible to the naked eye: no extensive growth of hair, or definite patches of spongy pubescence at the base of the upper surface of the arm: meropodites of legs subcylindrical: abdomen in both sexes consisting of 4 pieces:—

**1.** Outer edge of hand never carinate: front dorsally convex in all its extent: posterior margin of carapace, in the adult, usually gently convex, with its external angles not defined:—

**i.** True postero-lateral margin of carapace beaded as far as the level of the base of the last pair of legs: ventral surface of ischium of external maxillipeds of female almost flat—never broadly carinate:—

**a.** A loop of large granules between the base of the chelipeds and the margin of the carapace: two small red and white ocelli on either side of the gastric region ..... *L. unidentata.*

**b.** A single row of large granules between the base of the chelipeds and the margin of the carapace, and above it a second row of very small granules running into the puckered edge of an almost circular bight in the pterygostomial region: no ocelli ..... *L. obtusifrons.*

**ii.** True postero-lateral margin of carapace beaded only up to the level of the base of the first pair of true legs: a single row of large granules between the base of the chelipeds and the margin of the carapace:—

**a.** Carapace, excluding the whole front, broader than long, its posterior margin gently convex:—

**aa.** Thoracic sinus deep, the convex edge of the pterygostomial region, which defines the sinus

anteriorly, being finely granular: front ending in a triangular projecting beak: ventral surface of ischium of external maxillipeds of female broadly carinate up to a stout terminal tooth:—

a. Hepatic regions each forming a strong mammary bulge, dorsally, quite independent of the general convexity of the carapace: meropodites of true ambulatory legs perfectly smooth .....

*L. longifrons.*

β. Convexities of hepatic regions hardly distinguishable, dorsally, from the general convexity of the carapace: meropodites of true ambulatory legs with some longitudinal granulation:—

a1. Meropodites of legs with 3 rows of granules: inner edge of hand with several rows of granules: size under 25 millim.....

*L. neocaledonica.*

a2. Meropodites of legs with a single row of granules: inner edge of hand with a single row of granules: size over 35 millim.

*L. urania.*

bb. Thoracic sinus shallow, the convex edge of the pterygostomian region, which defines the sinus anteriorly, smooth and entire: edge of front sharply transverse, and sinuous: ventral surface of ischium of external maxillipeds of female non-carinate .....

*L. haswelli.*

b. Carapace, excluding the front, as long as broad, its posterior margin almost straight .....

*L. marmorea.*

2. Outer edge of hand raised into a sharp carina: posterior margin of carapace, in the adult, straight, with its external angles pronounced:—

i. Front dorsally concave in the middle line anteriorly:—

a. Size medium (carapace over 20 millim. long): thoracic sinus defined ventrally by a row of granules of which 3 or 4 are pearl-like .....

*L. pallida.*

b. Size small (carapace under 15 millim. long): thoracic sinus with at most three granules, two of which are very large and reniform or fungiform ...

*L. whitmeei.*

ii. Front convex dorsally in all its extent, produced between the orbits into a broadly triangular point as in *L. longifrons* .....

*L. corallicola.*

11. Carapace conspicuously longer than broad, sharply hexagonal, devoid of definite pubescence outside of the thoracic sinus, the thickened epimeral edge visible, dorsally, in all its extent when the carapace is held without any inclination straight in front of the observer's eyes: front ending in three sharp horizontal prongs: the thoracic sinus is filled with hair, and is not defined in any part of

its extent by granules visible to the naked eye : a definite patch of encrusting spongy pubescence at the basal end of the upper surface of the arm : meropodites of legs compressed : abdomen of the male consisting of 3 pieces, of the female of 4 pieces :—

1. Front much broader than long, distinctly trigonal, its sides merging in the antero-lateral borders of the carapace without any very abrupt transition : thoracic sinus deep, the edge of the pterygostomian region, which forms the anterior boundary of the sinus, convex and granular or milled : surface below the posterior margin of the dorsum of the carapace sharply granular :—

i. Outer limb of the thoracic sinus not invading the antero-lateral margin of the carapace ..... *L. craniolaris*.

ii. Outer limb of the thoracic sinus invading, and causing a marked emargination of, the antero-lateral border of the carapace ..... *L. vittata*.

2. Front about as long as broad, with the sides subparallel or, at any rate, forming an abrupt junction with the antero-lateral borders of the carapace : thoracic sinus shallow, the edge of the pterygostomian region, which forms the anterior boundary of the sinus, not strongly convex and not granular or milled :—

i. The edge of the pterygostomian region that bounds the thoracic sinus almost straight : surface of carapace below the posterior margin of dorsum granular : inner surface of hand with two prominent sharp-cut rows of granules : size about 14 millim. .... *L. rhomboidalis*.

ii. Edge of the pterygostomian region a little convex : surface of carapace below posterior margin smooth : inner surface of hand smooth, or with a single row of obsolescent granules : size about 18 millim. .... *L. pubescens*.

III. Carapace as broad as long, urn-shaped or broadly hexagonal, often with a strip of thick fur along the postero-lateral border, the thickened epimeral edge visible, dorsally, in all its extent when the carapace is held without any inclination straight in front of the observer's eyes : front obtuse : the thoracic sinus with or without granules : either a definite patch of spongy pubescence or a good deal of coarse hair at the basal end of the upper surface of the arm : meropodites of legs compressed : [abdomen of male consisting of 4 pieces, that of the female of 3, or if of 4, then the 3rd piece is again incompletely subdivided] : size very small, rarely 14 millim. :—

1. Lateral epibranchial angle and true postero-lateral border of the carapace with a sharply defined edging of thick fur :—

i. Outer edge of hand, if sharp, never distinctly carinate: front with the dorsal surface uniformly convex:—

a. Thoracic sinus defined ventrally by relatively large granules: hepatic region culminating, dorsally, in a granular eminence: arms covered with tubercles: hands subglobular: abdomen of female of 4 pieces, the large third piece incompletely subdivided into three ..... *L. whitei*.

b. Thoracic sinus not defined by granules: hepatic regions smooth and ill-defined: surfaces of arms not everywhere invested with tubercles, a definite patch of spongy pubescence at the basal end of the upper surface: hands of the ordinary form: abdomen of female formed of 3 pieces:—

aa. Four rows of tubercles—including those on the inner and outer margins—along the upper surface of the arm: fur and pubescence on carapace and chelipeds black (in spirit): carapace (in spirit) reticulated with bright brown ... .. *L. margaritata*.

bb. Upper surface of arm with only a few tubercles besides those on the margins: fur and pubescence yellowish white: carapace covered with crimson spots ..... *L. hæmatosticta*.

ii. Outer edge of hand strongly carinate: front with the dorsal surface concave in the middle line giving a bilobed appearance ..... *L. elata*.

2. Lateral epibranchial angle and true postero-lateral border of the carapace devoid of fur:—

i. Front prominent beyond the hepatic regions: posterior border of the carapace not equal in length to half the greatest breadth of the carapace: thoracic sinus deep and sharply defined in front: hand hardly longer than the fingers ..... *L. cumingii*.

ii. Front hardly prominent beyond the unusually strong convexity of the hepatic borders: length of the posterior border of the carapace more than half the greatest breadth of the carapace: hand about twice as long as the fingers ..... *L. sima*.

#### B. PECULIAR GENERA:—

I. Free edge of front not projecting beyond the level of the epistome. Otherwise belonging to the *craniolaris* group ..... *L. truncata*.

II. Hands foliaceous: chelipeds shorter than the carapace: thoracic sinus ill defined. Otherwise belonging to the *longifrons* and *marmorea* group ..... *L. phyllochira*.

46. *Leucosia unidentata*, De Haan.

*Leucosia unidentata*, De Haan, Faun. Japon., Crust., p. 133, pl. xxxiii, fig. 3: Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 284, and Cat. Leucos. Brit. Mus. p. 6: Haswell, P. L. S., N. S. Wales, Vol. IV. 1879, p. 44, and Cat. Austral. Crust. p. 118.

*Leucosia obtusifrons* var. *unidentata*, Ortmann, Zool. Jahrbucher, Syst. etc., VI. 1892, p. 585.

Carapace bluntly hexagonal or subcircular, about nine-tenths as long as broad: its surface perfectly smooth and devoid of hair: its antero-lateral borders sinuous, convex, faintly beaded anteriorly, strongly beaded posteriorly: its *true* postero-lateral border distinctly beaded or crenulate up to the level of the base of the *last* pair of legs: its thickened milled epimeral edge, which is continuous with the posterior margin and ends at a sharp tooth just behind the base of the chelipeds, is not visible, dorsally, when the carapace is held, without any inclination, straight in front of the observer's eyes: its posterior margin short, gently curved, finely beaded, with the deflexed surface below it quite smooth.

The puckered mouth of the pterygostomian invagination—the thoracic sinus of Bell and subsequent authors—shows as a roughly 9-shaped loop of equal-sized large pearly granules situated between the base of the chelipeds and the strongly-pronounced lateral angle, or eave, of the carapace: the pterygostomian plate is deeply indented, transversely, in front of this loop of granules.

The convexities of the hepatic regions are an almost indistinguishable part of the general convexity of the carapace.

The front is prominent, dorsally convex, and truncate-triangular; its length is less than its breadth; its front edge is strongly deflexed and very faintly trilobed, the middle lobe being mucronate.

The ventral surface of the ischium of the external maxillipeds in the female, as in the male, is flat and smooth.

The chelipeds in the adult male are considerably more than half again as long as the carapace. The upper surface of the arm has two divergent longitudinal rows of pearly tubercles in addition to those that bound its inner and outer borders: these two rows start from a basal eminence formed of 7 or 8 smaller coalescent tubercles, and end near the distal quarter of the arm. The inner surface of the arm is completely covered with pearly tubercles of unequal size: the under surface is smooth except in its basal third, or half. The wrist is smooth except for two lines of bead-like granules bounding its inner surface,—one line dorsal in position, the other ventral. The hand and fingers together are as long as the arm. The hand is half again as long as broad, its narrow inner surface bears several rows of small bead-like granules the upper and lower of which are sharply defined and converge



elegantly to the immobile finger, along which they are usually continued for some distance. The fingers are as long as the hand, and have their opposed edges crenulate throughout their extent.

The legs have stout subcylindrical meropodites (the trigonal origin of which, however, is shown by three longitudinal rows of fine granulation), inflated carpopodites, stout dorsally-sharp-edged propodites, and broadly lanceolate, or palmulate, dactyli.

The abdomen in both sexes consists of 4 distinct pieces, the third piece in the male bearing a strong tooth in the middle line.

Colours in spirit: carapace slate-grey with four small ocelli—two on either side of the gastric region: the ocelli have broad red circumferences and small white centres: the pearly tubercles of the upper surface of the arm have the base orange-red and the apex white: the fingers have a yellowish red base, and the legs are indefinitely banded with yellowish red.

The carapace of an adult of average size, of either sex, is about 30 millim. long and 27 millim. broad.

In India this species has been found only off the Malabar Coast at 45 fathoms. In the Museum collection are an adult male and female, and three half-grown females from the Malabar Coast, (and four adult females from Hongkong.)

#### 47. *Leucosia obtusifrons*, De Haan

*Leucosia obtusifrons*, De Haan, Faun. Japon. Crust. p. 133, pl. xxxiii. fig. 2: Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 284, and Cat. Leucos. Brit. Mus. p. 6: A. Ortmann, Zool. Jahrbucher, Syst. etc. VI. 1892, p. 585.

Differs from *L. unidentata*, De Haan, only in the following characters, adults of both sexes being compared:—

1. The puckered mouth of the pterygostomian invagination—or thoracic sinus—is still visible in all its extent as a long loop of granules lying between the base of the chelipeds and the cave of the carapace; but the granules of the dorsal limb of the loop are so small as to be only visible with a lens; those of the front convexity of the loop have—by a further infolding of the pterygostomian region—become partly welded together and cut off to form an almost isolated ring; while only those that form the ventral limb of the loop remain as large separate granules.

2. The two rows of tubercles on the upper surface of the arm are shorter, ending within the proximal half of the arm.

3. The chelipeds, in the adult male, are less than half again as long as the carapace.

4. The dactyli of the legs are narrowly lanceolate, not palmulate.

5. On either side of the gastric region are two white spots, instead of two red and white ocelli.

6. The body is somewhat smaller, the carapace in the average adult male measuring 25 by 23 millim., and in the average adult female 26 by 24 millim.

In the Museum Collection are 2 adult males, 4 egg-laden females, 2 young males, and a young female, from the Coromandel Coast.

The structural and colour differences hold good irrespective of age or sex, and I therefore think that De Haan's separation of this species from the preceding is justified.

#### 48. *Leucosia longifrons*, De Haan.

? *Cancellus anatum secundus*, Rumph. Amboin. Rariteitkamer, I. 27, pl. x. fig. B.

? *Araneus marinus*, Seba, Thesaurus, III. 46, pl. xix. figs. 4, 5.

*Leucosia longifrons*, De Haan, Faun. Japon. Crust. p. 132, pl. xxxiii, fig. 4: Bell, Trans. Linn. Soc. Vol. XXI 1855, p. 284, and Cat. Leucos. Brit. Mus. p. 6: A. Ortmann, Zool. Jahrbüch., Syst. etc., VI. 1892, p. 585.

? *Leucosia urania*, Guérin, Icon. R. A. Crust., pl. vi. fig. 4 (nec Herbst).

*Leucosia polita*, Hess, Archiv für Naturges. XXXI. i. 1865, pp. 155 and 172, pl. vi. fig. 14; (and ? Haswell, Cat. Austral Crust. p. 120); *vide de Man*, Zool. Jahrbüch. Syst. etc., II. 1892, p. 585.

*Leucosia ornata*, Miers, Trans. Linn. Soc., Zool., (2) I. 1875-79, p. 236, pl. xxxviii. figs. 7-9.

*Leucosia urania*, de Man, Journ. Linn. Soc., Zool., Vol. XXII. 1888, p. 197 (nec Herbst).

Carapace bluntly rhomboidal, about nine-tenths as long as broad: its surface perfectly smooth and devoid of hair: its antero-lateral borders finely beaded, and strongly sinuous, owing to the prominence of the edge of the well-defined hepatic region: its true postero-lateral border beaded only as far as the level of the first pair of legs (2nd pereopods): its thickened milled epimeral border is visible, dorsally, only in its posterior third when the carapace is held, without any inclination, straight in front of the observer's eyes: its posterior margin short, gently curved, and finely beaded, with the deflexed surface below it quite smooth.

The thoracic sinus is no longer recognizable as the puckered mouth of a simple pterygostomian invagination: it is now a roughly Y-shaped cavity, the tail of the Y being defined by a line of 6 or 7 large pearly granules continuous with the milled epimeral edge of the carapace, the concavity of the fork of the Y being defined by the convex crenulated edge of the pterygostomian region, and the outer limb of the Y being a good deal longer than the inner.

The hepatic regions are strongly convex dorsally, their convexities being quite independent of the general convexity of the carapace.

The front is prominent, triangular, and dorsally convex; its length is at least equal to its breadth, and it ends in a projecting laminar triangular tip.

The ventral surface of the ischium of the external maxillipeds of the female is strongly convex up to a stout terminal tooth.

The chelipeds, in the adult male, are less than one-third longer than the carapace. The upper surface of the arm has both its anterior and posterior borders defined by a distally-incomplete row of tubercles, and, besides the basal eminence formed of 6 to 8 coalescent granules, has four—rarely five or more—large tubercles disposed in an irregular square just beyond the basal eminence: the inner surface of the arm has a few tubercles in its proximal half, as has also the under surface in its proximal fourth. The wrist is quite smooth. The hand is very little longer than broad, its inner edge bears a single row of granules which are often indistinct. The fingers are not much shorter than the hand, and their opposed edges are crenulate—and that but indistinctly—only in their distal two-thirds.

The legs have stout, subcylindrical, perfectly smooth meropodites, inflated carpopodites, propodites with a sharpish dorsal edge, and, in the case of the last pair, with the ventral edge sharp also, and narrowly lanceolate dactyli which are more than half again as long as their propodites.

The abdomen in both sexes consists of 4 distinct pieces, the third piece, in the male, having a denticle in the middle line.

Colours in spirit: carapace light yellowish-brown, with a horseshoe of six impressed white spots in the gastric region, and with a narrowly defined red ring in either branchial region posteriorly; legs broadly banded with yellowish red; fingers with reddish base and white tip; tubercles on upper surface of arm with red base, sharply defined, and white apex.

The carapace of an average adult male is 22 millim. long and 18 millim. broad, of an adult female 25 millim. long and 22 millim. broad.

Over 80 specimens of all ages, from the Andamans, Mergui, Ceylon, and the Persian Gulf.

48a. *Leucosia longifrons*, var. *neocaledonica*, A. Milne Edwards.

*Leucosia neocaledonica*, A. Milne Edwards, Nouv. Archiv. du Mus. X. 1874. p. 40, pl. ii. fig. 1; and? Haswell, P. L. S., N. S. Wales, Vol. IV. 1879, p. 46; and? de Man, Notes Leyden Mus. III. 1881, p. 123.

? *Leucosia urania*, de Man, Notes Leyden Mus. III. 1881, p. 256.

This is certainly a well-marked variety, and perhaps a distinct

species. It differs from *L. longifrons*, De Haan, only in the following characters, adults of both sexes being compared :—

1. The carapace is closely punctate.
2. The antero-lateral border is *sharply* crenulate.
3. The hepatic regions although equally convex in the antero-lateral margins, have their dorsal convexity hardly distinguishable from the general convexity of the carapace.
4. The terminal tooth on the ventral surface of the ischium of the external maxillipeds of the female is extremely acute and prominent.
5. Along the inner edge of the hand, below the upper row of granules, which are very distinct, are several indefinite rows of granules.
6. Along the inner edge of the upper surface of the wrist is a line of 3 or 4 granules.
7. The meropodites of the ambulatory legs have three distinct longitudinal lines of granules,—one dorsal, two ventral.
8. The propodites of the ambulatory legs have their dorsal edges not merely sharp, but highly carinate, and have also their ventral edges carinate.

9. The colours, when good fresh spirit specimens are compared, are very different. On the gastric region is a pair of large ocelli with small white centres and very broad red outer rings. In faded specimens the colours are much those of *L. longifrons*, but even then, instead of two round spots or rings in the posterior half of the carapace, there are from 4 to 6 large spots round the posterior half of the circumference of the carapace.

Its average size is a little less than that of *L. longifrons*.

In the Museum collection are 35 adult males and females from Palk Straits, from Karáchi, and from the Persian Gulf.

48b. *Leucosia longifrons*, var. *pulcherrima*, Miers.

? *Cancellus anatum primus*, Ramph, Amboin. Rareitetskamer, I. 27, pl. x. fig. A.  
*Leucosia pulcherrima*, Miers, Trans. Linn. Soc., Zool., (2) I. 1875-79, (1877) p. 236, pl. xxxviii. figs. 4-6 : Haswell, P. L. S., N. S. Wales, Vol. IV. 1879, p. 46, and Cat. Austral. Crust. p. 119.

*Leucosia splendida*, Haswell, P. L. S., N. S. Wales, Vol. IV. 1879, p. 47, pl. v. fig. 1, and Cat. Austral. Crust. p. 119.

This is certainly only a variety of *L. longifrons*, De Haan, from which it differs chiefly in the colouration, which is altogether richer and more brilliant. Adult females compared, the only apparent differences from *L. longifrons* are as follows :—

1. The surface of the carapace is slightly punctate.
2. The propodites of the ambulatory legs are highly carinate dorsally, and have also their ventral edges carinate, as in var. *neocaledonica*.

3. The two red rings on the posterior half of the carapace are often, but not always, much larger, and the six white spots on the anterior part of the carapace are enclosed in six red circles, which often partly coalesce to form a double trefoil pattern.

In the Museum collection are an adult female, two half-grown females, and a half-grown male, all from the Persian Gulf; and the characteristic trefoil pattern occurs only in the adult female.

#### 49. *Leucosia urania*, Herbst.

*Leucosia urania*, Herbst, Krabben, III. ii. 17, pl. liii. fig. 3: Leach, Zool. Miscell. III. p. 21: Desmarest, Consid. Gen. Crust., p. 167: Milne Edwards, Cuv. Règne An., Crust. pl. xxv. fig. 1, and ? Hist. Nat. Crust. II. 122: Bell, Trans. Linn. Soc. XXI. 1855, p. 283, and Cat. Leucos. Brit. Mus. p. 6: Hilgendorf, MB. Ak. Berl. 1878, p. 811.

This species, although closely resembling *L. longifrons*, and especially the variety (or species) *neocaledonica*, is at once distinguished from these, and from all other species, by its comparatively great size. It is a giant in the genus *Leucosia*, the carapace of an adult female in the Indian Museum collection being 38 millim. long and 34 millim. broad, dimensions almost equalled by Herbst's figure.

It differs from *L. longifrons* only in the following particulars, adult females being compared:—

1. It is very much larger.
2. The antero-lateral border is but slightly sinuous, owing to the slight prominence of the hepatic regions, of which also the dorsal convexities are an almost indistinguishable part of the general convexity of the carapace.
3. The hand is as broad as long, and the fingers have their opposed edges crenulate throughout.
4. The meropodites of the legs are traversed ventrally by a line of granules.
5. The propodites of the legs are foliaceous.
6. The dactyli are broadly lanceolate, and are only equal in length to their propodites.
7. Colours (of a thoroughly well-preserved specimen that has been eight years in spirit) olive green, with a broad white median band, forked posteriorly, extending from the tip of the front to the after end of the gastric region; four dusky red blotches round the posterior half of the circumference of the carapace: legs yellow, banded with red; basal half of fingers red.

*Loc.* Andamans.

The single female specimen in the Indian Museum collection is the exact counterpart of Herbst's figure.

50. *Leucosia marmorea*, Bell.

*Leucosia marmorea*, Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 286, pl. xxx. fig. 4: E. Nauck, Zeits. Wiss. Zool. XXXIV. 1880, p. 49 (*gastric teeth*): A. O. Walker, Journ. Linn. Soc., Zool., Vol. XX. 1890, p. 111.

Carapace highly polished, piriform, *longer than broad by the whole extent of the front*: its antero-lateral borders finely beaded, *slightly sinuous*, and *gradually convergent*: its true postero-lateral border beaded only as far as the level of the first pair of legs (2nd pereopods): its epimeral edge not visible in a dorsal view: its finely-beaded posterior margin *almost straight*, with the surface below it quite smooth.

The thoracic sinus is a roughly Y-shaped cavity, the tail of the Y being defined by a line of 5 or 6 small pearly granules continuous with the milled epimeral edge, the concavity of the Y being defined by the convex, *very finely crenulated* edge of the pterygostomian region, and both limbs of the Y being very short.

The hepatic regions are hardly defined posteriorly by a faint crease.

The front is prominent, dorsally convex, and truncate-triangular, ending in three minute teeth, of which the middle one is the largest.

The ventral surface of the ischium of the external maxillipeds of the female is smooth, *and not strongly convex*.

Chelipeds little longer than the carapace. The arm has its three borders tuberculate; its upper surface with 5 to 7 pearly tubercles, in two short rows, in its basal half, just beyond a basal eminence formed of 6 to 8 coalescent granules; its inner surface granular or tubercular in rather more than its basal half, and its under surface in rather more than its basal third. The wrist and hand both have a row of sharp-cut granules along their inner edge. The fingers, which meet only at their tips, have the opposed edges distantly crenulate.

The legs are slender: their meropodites are subcylindrical with longitudinal rows of microscopic granulation, dorsally and ventrally: their propodites have sharpish edges, but are not dilated: their dactyli, which are somewhat longer than the propodites, are very narrowly lanceolate.

Colours in spirit: rich warm yellowish-brown with two pale round spots on either side of the gastric region.

Length of carapace of an adult female 23 millim., breadth 18.5 millim.

A young and four adult females from the Andamans.

Among Indian species of the *L. longifrons* group, this is at once recognized by its elongate piriform carapace, by its truncate front, by its nearly straight posterior margin, by its slender legs, and by its warm cinnamon brown colour.

51. *Leucosia haswelli*, Miers.

*Leucosia haswelli*, Miers, 'Challenger' Brachyura, p. 324, pl. xxvii. fig. 2.

Carapace with the antero-lateral margins slightly sinuous, owing to the slight convexity of the hepatic regions, which also are defined posteriorly, on the dorsum of the carapace, only by a faint crease. In other respects the carapace almost exactly resembles that of *L. longifrons*, but is a little more convex.

The front ends abruptly in a projecting, sharply transverse, sinuous edge, the edge under a lens being seen to be faintly bilobed with each lobule again faintly emarginate.

The thoracic sinus is a roughly Y-shaped cavity of no great depth, the tail of the Y being defined by four large pearl-like granules situated above the base of the chelipeds, the concavity of the fork of the Y being defined by the convex perfectly smooth edge of the pterygostomian region, and the limbs of the Y being both equally short.

The ventral surface of the ischium of the external maxillipeds of the female is moderately convex without a terminal tooth.

The chelipeds are almost exactly like those of *L. longifrons*; but on the upper surface of the arm there are always at least six pearly tubercles, in two short lines, running forwards from the basal eminence formed of coalescent granules, and these tubercles, like some of those on the inner edge of the arm, are of an uniform transparent blood-red colour; the wrist has a row of tiny blood-red granules along its inner edge; and the hand has not only a row of granules along its inner edge, but also, below this, a row of punctuations which become granules on the immobile finger: finally, the fingers are crenulate along the whole extent of their opposed edges.

Except that their propodites are sharply carinate, the legs exactly resemble those of *L. longifrons*.

Colours in spirit: light greenish yellow, mottled with darker, and with a dark greenish brown blotch on the posterior part of either branchial region and two white spots on either side of the gastric region.

Size of carapace of an adult male 21 millim. long and 18 millim. broad, of an adult female 22.5 by 20 millim.

37 specimens, young and adult, of both sexes, from the Andamans, are in the Indian Museum collection. In the smallest young the carapace is more elongate and its posterior border is almost straight, its whole shape being very much like that of *L. marmorea*, Bell.

52. *Leucosia pallida*, Bell.

*Leucosia pallida*, Bell, Trans. Linn. Soc. Vol. XXI. 1885, p. 285. pl. xxx. fig. 2, and Cat. Leucos. Brit. Mus. p. 7: E. Nauck, Zeits. Wiss. Zool. XXXIV. 1890, p. 48. (gastric teeth).

*Leucosia obscura*, Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 285, pl. xxx. fig. 3, and Cat. Leucos. Brit. Mus. p. 7.

*Leucosia pallida*, var. *obscura*, Miers, Ann. Mag. Nat. Hist. (5) V. 1880, p. 316.

? *Leucosia parvimana*, Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 159.

? *Leucosia moresbiensis*, Haswell, P. L. S., N. S. Wales, Vol. IV. 1879, p. 49.

? *Leucosia perlata*, de Man, Notes Leyden Mus. III. 1881, p. 124 : Ortmann, Zool. Jahrbüch Syst. etc., VI. 1892, p. 584.

Carapace more nearly circular than in any other species of the genus, owing to the convexity of the antero-lateral margins ; its surface perfectly smooth ; its antero-lateral margins crenulate : its *true* postero-lateral margins beaded almost up to the level of the 2nd pair of legs (3rd pereopods) ; its epimeral edge not visible in a dorsal view ; its posterior margin in the adult, as well as in the young, nearly *straight, salient, and having the outer angles dentiform*, the deflexed surface below being quite smooth.

The thoracic sinus is a Y-shaped cavity of no great depth ; the tail of the Y being defined by a row of 6 or 7 granules, *three or four of which are large and pearl-like* ; the concavity of the fork of the Y being defined by the convex smooth edge of the pterygostomian region ; and both limbs of the Y being equally short.

The front is much broader than long *and is distinctly concave in the mid-dorsal line, anteriorly* : it ends in three denticles, the middle one of which is the most prominent.

The ventral surface of the ischium of the external maxillipeds of the female is strongly convex up to a stout terminal tooth.

The upper surface of the arm is traversed, in its proximal half, by 7 to 9 pearly tubercles arranged in two rows running forwards from the basal eminence formed by the usual mass of coalescent granules : the inner edge of the upper surface of the wrist bears a few tiny tubercles : *the hand, which is more than three-fourths as broad as long, has its outer edge strongly carinate*, and its inner edge granular : the fingers meet only at their tips, where alone they are faintly denticulate, their length is four-fifths that of the hand.

Except that they are more slender, and have sharply carinated propodites, and slender very narrow dactyli, the legs are as in *L. longifrons*.

Colours in spirit : delicate lavender grey marbled with darker ; a pair of brown spots in the posterior part of the carapace, and two pairs of pale spots in the gastric region.

The carapace of an adult female is 21 millim. long and 18 millim. broad.

In the Indian Museum collection are 3 adult females (one with eggs) from the Andamans, and a young male from the Persian Gulf.



53. *Leucosia corallicola*, n. sp. Plate VI. fig. 4.

Carapace somewhat piriform, longer than broad almost by the whole length of the front: the antero-lateral borders gradually converging, and coarsely crenulate up to the smooth sharp lateral borders of the front: the true postero-lateral border, which is also crenulate, ceases abruptly at the level of the first pair of true legs: the posterior margin is quite straight with the outer angles pronounced: the epimeral edge is only visible dorsally in its posterior part.

The thoracic sinus is deep and distinct, but short and in places ill defined: its longitudinal limb is bounded by 3 or 4 small (small because the species is small) granules above the base of the chelipeds: the edge of the pterygostomian region, which defines it in front, is convex and irregularly wrinkled but not granular.

The front is almost as in *L. longifrons*: it is long, strongly convex dorsally, and ends in a broad triangular somewhat deflexed tip which projects beyond the orbits.

The ventral surface of the ischium of the external maxillipeds is not abnormally convex.

The chelipeds are as in *L. pallida*, as are the legs.

Colours in spirit: light yellow marbled with brownish. The carapace of not quite adult females, and of the males, is 10 millim. long and 8 millim. broad.

*Loc.* Off Malabar Coast, 29 fathoms on a bottom of "hard flat coral slabs" (Alfred Carpenter).

This species may possibly be Bell's *L. affinis* (Trans. Linn. Soc. Vol. XXI. 1855, p. 287, pl. xxx. fig. 6), but the front and the thoracic sinus are quite different from the figures of that species. It is certainly not the immature form of *L. longifrons*, *L. haswelli*, *L. pallida*, or *L. whitmeei*, to which group it belongs. Among Indian forms its closest relative is *L. pallidu* Bell.

54. *Leucosia whitmeei*, Miers.

*Leucosia whitmeei*, Miers, Ann. Mag. Nat. Hist. (4) XVI. 1875, p. 342, and Trans. Linn. Soc., Zool., (2) I. 1875-79, p. 238, pl. xxxviii. figs. 16-18: J. R. Henderson, Trans. Linn. Soc. Zool., (2) V. 1893, p. 397.

Carapace piriform, longer than broad by the whole length of the front; the antero-lateral borders hardly sinuous, gradually converging, and finely milled; the true postero-lateral border, which is also finely milled, ceases abruptly at the level of the interval between the chelipeds and the first pair of legs; the posterior margin, in the adult, no less than in the young, almost straight, with the external angles somewhat pronounced, the deflexed surface below being quite smooth; the epimeral edge visible to dorsal view only in its posterior part.

The thoracic sinus is a deep hardly Y-shaped cavity, since the outer limb of the Y is greatly produced and the inner limb is very short: the tail of the Y is defined by *two singularly large fungiform or reniform tubercles* with sometimes a third smaller one behind, and the strongly convex edge of the pterygostomial region, which defines the thoracic sinus in front, is finely milled.

The front is prominent, *almost quadrangular, with a sharply transverse sinuous edge and with its dorsal surface, anteriorly, markedly concave.*

The ventral surface of the ischium of the external maxillipeds of the female is broadly carinate up to a strong terminal tooth.

The chelipeds, in the adult male, are very little longer than the carapace. The arm is slender and is ornamented as in *L. pallida*: the wrist is quite smooth: the hand, which is *nearly twice as long as broad and nearly twice the length of the fingers*, has its outer edge carinate and its inner edge sharp: the short fingers meet only at the tip, where alone they are faintly denticulate. The legs are as in *L. pallida*.

Colours in spirit: fawn colour, the front of the carapace sometimes light olive-green; four large round brown spots round the circumference of the carapace behind; two pale spots on either side of the gastric region.

The carapace of the adult male is 14 millim. long and 11 millim. broad; that of the adult female is 13 millim. long and 11 millim. broad.

A young male and 26 adults of both sexes (many of the females with eggs) from the Andamans, are in the Indian Museum collection.

### 55. *Leucosia whitei*, Bell.

*Leucosia whitei*, Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 289, pl. xxxi. fig. 2, and Cat. Leucos. Brit. Mus. p. 9: Hess, Archiv für Naturges. XXXI. i. 1865, pp. 155, 172: Haswell, P. L. S., N. S. Wales, Vol. IV. 1879, p. 45, and Cat. Austral. Crust. p. 118: Miers, Zool. H. M. S. 'Alert,' pp. 184, 289, and 'Challenger' Brachyura, pp. 322 (footnote), 325: A. O. Walker, Journ. Linn. Soc., Zool., Vol. XX. 1890, p. 111.

? *Leucosia cherrettii*, Haswell, P. L. S., N. S. Wales, Vol. IV. 1879, p. 47, pl. v. fig. 2, and Cat. Austral. Crust. p. 120.

Carapace not appreciably longer than broad, elegantly urn-shaped; its surface smooth, except for (1) a narrow strip of thick short fur clothing its postero-lateral border, (2) a sharp angular granule-tipped eminence springing from the vault of either hepatic region, and (3) a patch of granules just dorsad of the lateral epibranchial angle; its antero-lateral border smooth as far as the front end of the thoracic sinus, and then beaded; its *true* postero-lateral border beaded as far as the level of the base of the 2nd pair of legs (3rd pereopods); its epimeral edge visible in all its extent dorsally; its posterior margin gently curved,

the inflexed surface below it having numerous punctuations and squamous granules.

The thoracic sinus is a simple cavity defined ventrally by a loop of small somewhat irregular granules, and not very well defined in front.

The front is broader than long, dorsally convex, and its tip, which is truncated pitted and deflexed, ends in 3 broad denticles.

The ventral surface of the ischium of the external maxillipeds of the female is smooth (non-carinate).

The sub-cylindrical arm is closely nodular everywhere except in the middle of the ventral surface; the sub-globular wrist has about half of its upper surface, and a band on the inner edge of its under surface, granular: the hand is inflated, or sub-globular, with its base granular, and its inner edge sharply crenulate: the fingers, which are not much shorter than the hand, meet only at their tips, where alone they are denticulate.

The legs are compressed: the meropodites, which are much compressed, are finely granular along the edges; the carpopodites and propodites are sharply carinate, dorsally; the dactyli, which are nearly as long as their propodites and carpopodites together, are narrowly lanceolate.

The abdomen of the female consists of 4 pieces, and the large third piece is again subdivided into 3 pieces by two deep furrows which, however, are broadly interrupted in the middle line.

A single egg-laden female from the Andamans has the carapace 14 millim. long and 13.5 millim. broad.

The colours, according to Bell, are light brown with small angular red spots on the carapace, and a large red spot on the upper surface of the hand.

Our single specimen, which has been in strongly carbolized spirit for over 20 years, is now an uniform stone grey.

#### 56. *Leucosia cumingii*, Bell.

*Leucosia cumingii*, Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 290, pl. xxxi. fig. 3, and Cat. Leucos. Brit. Mus. p. 9.

Carapace quite devoid of marginal fur, a little broader than long, the inequality being hardly appreciable in the adult female, elegantly hexagonal as in the preceding species. The antero-lateral border, the main curve of which would be slightly concave, is convex by reason of the strongly marked angular projection of the hepatic region. The antero-lateral margin may be obscurely milled just in front of its junction with the true postero-lateral border, but the latter, as well as the posterior margin, is quite smooth: the posterior margin is gently curved, and in the male prominent.

The thoracic sinus is a deep obscurely Y-shaped cavity full of hair, the tail of the Y being defined by a row of 5 flat pearly granules situated above the chelipeds, the inner limb of the Y being very short, and the outer limb of the Y being produced up to the antero-lateral border to accent the boundary between the hepatic and branchial regions, the concavity of the fork of the Y being sharply defined by the smooth convex edge of the pterygostomial region.

The front is broader than long, deflexed and obscurely bilobed at tip, and *a little concave in the mid-dorsal line anteriorly*.

The ventral surface of the ischium of the external maxillipeds of the female is perfectly flat.

The edges of the trigonal arm are tuberculate: on the upper surface of the arm two short rows of tubercles arise from a mass of granules and short hairs at the base of the arm, and run, one towards the inner, one to the outer, edge of the arm: the wrist and the hand are quite devoid of granules: the fingers are nearly as long as the hand, and meet only at the tips.

The legs have all the joints compressed but not dilated.

The abdomen of the male consists of 4 pieces, that of the female of 3 pieces only.

Colours in spirit: yellowish white with yellowish brown markings, the hand and the fingers each with a brownish cross-band, the abdomen of the female with brownish yellow markings in its anterior (true posterior) third.

A male and an egg-laden female from the Nicobars: the carapace of the male is 11 millim. long and 10 millim. broad, that of the female is  $12 \times 11.5$  millim.

#### 57. *Leucosia sima*, n. sp. Plate VI. fig. 5.

Very closely related to *L. cumingii*, but differs from it, and from all other species of the genus, in the length of the posterior margin of the carapace, which is considerably more than half the greatest breadth of the carapace. Its form therefore would be broadly hexagonal, but owing to the shortness of the front and to the great convexity of the hepatic regions, it almost forms a pentagon.

Besides in the form of the carapace, which is unique in the genus, it differs from *L. cumingii*, Bell, only in the following characters, adult females being compared:—

1. The front hardly breaks beyond the general convexity of the anterior half of the carapace owing to the still greater angular prominence of the hepatic regions.

2. The antero-lateral margin of the carapace behind the angular

prominence of the hepatic region, and the postero-lateral margin up to the level of the base of the 1st pair of legs, are distinctly beaded.

3. The thoracic sinus has no definite boundary in front, although it is deep and defined ventrally by large pearly granules as in *L. cumingi*.

4. The inner edge of the upper surface of the wrist bears a row of granules, which is continued on to the base of the hand.

5. *The fingers are only half the length of the hand.*

An adult egg-laden female from Bombay has the carapace 13 millim. long and 13 millim. broad.

### 58. *Leucosia elata*, A. Milne Edwards.

*Leucosia elata*, A. Milne Edwards, Nouv. Archiv. du Mus. Vol. X. 1874, p. 41, pl. ii. fig. 2.

Carapace as broad as long, hexagonal, with the antero-lateral borders strongly convex and smooth: the *true* postero-lateral border is clothed with a strip of dense dark-coloured fur: there are also a few scattered stiff hairs on the posterior part of the epibranchial regions.

The thoracic sinus is a simple cavity, deep, sharply defined anteriorly, containing a good many hairs and a line of tiny granules, besides the row of 2 or 3 larger pearly granules (situated above the base of the chelipeds) which define it ventrally.

The front is prominent, broader than long, concave in the mid-dorsal line and distinctly bilobed.

The arm is markedly trigonal *with the antero-external angle expanded*, its upper surface is bounded internally by a row of pearly tubercles, externally by a row of pearly granules, and is otherwise smooth, except for a few granules almost hidden in hair and a single larger tubercle at its base. The wrist is smooth and subglobular, with obscure traces of carination along its outer surface. The hand is a little longer than broad and has its outer edge strongly carinate, the carina being continued on the mobile finger, where, however, it is less marked: the little lobule at the base of the inner margin of the hand is beaded all round its edge. The fingers, which are not much shorter than the hand, meet only at the tip, and have their opposed edges smooth throughout.

The legs are much compressed, and have the carpopodites strongly carinate dorsally, the propodites strongly carinate dorsally and ventrally, and the dactyli extremely slender and hardly as long as their propodites: the meropodites also of the last pair are carinate dorsally.

Colours in spirit: porcelain white or pale yellow. M. A. Milne Edwards describes the colours as bright greenish grey with numerous specks of orange red.

Besides a specimen from Upolu purchased from the Museum

Godeffroy, there are, in the Indian Museum collection two apparently adult males dredged, one off the south coast of Ceylon in 34 fathoms, and the other from the Persian Gulf.

The carapace of the latter is 8·5 millim. long and 8·5 millim. broad.

59. *Leucosia hematosticta*, Adams and White.

*Leucosia hematosticta*, Adams and White, Zool. 'Samarang,' Crust. p. 54, pl. xii. fig. 2: Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 289, and Cat. Leucos. Brit. Mus. p. 8: Stimpson, Proc. Acad. Nat. Sci. Philad. 1858, p. 160: Miers, P. Z. S. 1879, pp. 20 and 41: A. O. Walker, Journ. Linn. Soc., Zool., Vol. XX. 1890, p. 111.

Carapace sharply hexagonal, elegantly urn-shaped, its breadth equal to its length; its surface smooth except for a strip of thick short harsh white fur, which extends from the lateral epibranchial angle along the whole length of the *true* posterior border; its antero-lateral borders slightly concave and smooth, or very faintly milled; its *true* postero-lateral border ending abruptly at the level of the base of the second pair of legs (3rd pereopods); its thickened milled epimeral edge, which is continuous with the posterior margin and ends at a sharp tooth just behind the base of the chelipeds, is visible, dorsally, in all its extent, when the carapace is held, without any inclination, straight in front of the observer's eyes; its posterior margin perfectly straight, with the outer angles well defined, and with the deflexed surface below it perfectly smooth.

The thoracic sinus is a simple cavity, defined in front by the smooth, very oblique, slightly convex edge of the pterygostomian plate: it is more or less filled with hair and is devoid of granules large enough to be seen with the naked eye.

The front is prominent, dorsally convex, much broader than long, and has its sinuous front margin strongly deflexed.

The chelipeds in the adult male are about one half as long again as the carapace. The upper surface of the trigonal arm has a single line of tubercles along its inner border, and a partly-fused double row along its outer border; at its base are some small tubercles hidden in a well-defined patch of encrusting spongy pubescence, of a whitish colour, from which two or three tubercles run forward to the inner border. The ventral border of the arm is tubercular, the tubercles arising somewhat profusely in a dense patch of spongy pubescence; the inner and under surfaces are quite smooth. The wrist is smooth, except for one or two tiny granules along its inner edge. The hand is a little longer than broad, its inner surface has a single row of granules, which is continued some way along the immobile finger. The fingers are about as long as the hand, and are somewhat hairy: their opposed edges

are crenulate along the distal two-thirds, the crenulation being most marked on the immobile finger.

The legs have the meropodites compressed, and concave on the ventral surface, the concavity being defined by two prominent longitudinal lines of granulation; the carpopodites dorsally subcarinate, but not dilated; the propodites carinate both dorsally and ventrally, but not dilated; and the dactyli narrowly lanceolate, and nearly as long as their carpopodites and propodites combined.

The abdomen of the male consists of 4 pieces, the third piece having a strong tooth in the middle line: that of the female consists of only 3 pieces.

Colours in life and in spirit: front pinkish-grey; the rest of the carapace ivory white covered with roundish crimson spots, which may be scattered, or may form a definite network: thoracic sterna, abdominal terga and external maxillipeds with similar spots; and a few similar but larger spots on the upper surface of all the joints of the chelipeds: legs banded with crimson.

In the Museum collection are two adult males and a half-grown female from the Madras side of Palk Straits, in 12 fms. and upwards.

The carapace of the largest male is 12.5 millim. long and 12.5 millim. broad.

#### 60. *Leucosia margaritata*, A Milne Edwards.

*Leucosia margaritata*, A. Milne Edwards, Nouv. Archiv. du Mus. X. 1874, p. 42, pl. ii. fig. 3.

Differs from *L. hæmatosticta*, Ad. and Wh., only in the following particulars:—

1. Its size is even smaller, the carapace in the adult of either sex measuring only 8.5 millim. in length and 8.5 millim. in breadth.

2. The spongy pubescence on the base of the chelipeds, and the fur along the postero-lateral edge of the carapace are coal-black.

3. The hepatic regions are indicated by faint bulgings above the antero-lateral border.

4. The thoracic sinus is much shallower, being, in fact, almost obsolete.

5. The upper surface of the arm is bounded both in front and behind by two rows of pearly tubercles.

6. On the ventral surface of the basal joint of the external maxillipeds there is a sharp stout tooth, and another on the ventral surface of the ischium joint of the female.

7. Colours in spirit: old ivory white, the carapace and chelipeds elegantly reticulated with bright reddish brown.

In the Indian Museum collection are two adult males and an adult female laden with eggs. All came from an encrusted bottom of shells and shingle; one from the Andamans, one from the Malabar coast at 26–31 fms., and one from the Coromandel coast at 18 fms.

61. *Leucosia craniolaris*, (Herbst.)

?? *Cancer craniolaris*, Linnæus, Mus. Lud. Ulr. p. 431, and Syst. Nat., 12th ed., p. 1041.

*Cancer craniolaris*, Herbst, Krabben, I. ii. 90, pl. ii. fig. 17; and (?) Fabr. Ent. Syst. II. 441.

*Leucosia craniolaris*, Fabr. Ent. Syst. Suppl. p. 350: Leach, Zool. Misc. III. p. 21: Milne Edwards, Hist. Nat. Crust. II. 122: Bell, Trans. Linn. Soc. 1855, p. 283, and Cat. Lencos. Brit. Mus. p. 6: Miers, 'Challenger' Brachyura, p. 325, pl. xxvii. fig. 3: A. O. Walker, Journ. Linn. Soc. Zool. Vol. XX. 1890, p. 111: J. R. Henderson, Trans. Linn. Soc. Zool. (2) V. 1893, p. 397.

*Leucosia craniolaris*, var. *lævimana*, Miers, Zool. H. M. S. Alert, pp. 184 and 250, pl. xxvi. fig. A.

Carapace rather sharply hexagonal, about six-sevenths as long as broad: its surface perfectly smooth and devoid of hair: its antero-lateral borders finely beaded, almost straight, and gradually converging to join the sides of the truncate-triangular front without any abrupt break: its *true* postero-lateral border beaded, the beading ending rather abruptly at the level of the base of the first pair of legs (2nd pereopods): its thickened milled epimeral edge, which is continuous with the posterior margin and ends at a sharp tooth just behind the base of the chelipeds, is visible, dorsally, in all its extent when the carapace is held, without any inclination, straight in front of the observer's eyes: its posterior margin is almost straight and finely beaded, and the deflexed surface below it is covered with rows of sharp granules.

The thoracic sinus is a deep cavity full of hair, and—when denuded—is devoid of any tubercles or granules visible to the naked eye: it is bounded in front by the finely beaded, or milled, convex edge of the pterygostomial plate, so as to end in two broad notches of nearly equal size. The convexities of the hepatic regions are an indistinguishable part of the general convexity of the carapace.

The front is prominent, dorsally convex, and truncate triangular; its length is less than its breadth; and it ends in five prongs, the outer of which on either side are the sharp external orbital angles, and the middle one of which is by far the most prominent.

The ventral surface of the ischium of the external maxillipeds, in the female, is strongly convex up to a strong terminal tooth.

The chelipeds, in the adult male, are two-thirds longer than the carapace: the trigonal arm has beaded edges, the beading failing at the distal end of the outer border, and being spread out and profuse at the



proximal end of the ventral border: all the surfaces of the arm, however, are practically smooth, for although there are a few small tubercles at their proximal ends, these are covered and almost concealed by a dense adherent encrusting spongy pubescence, which is specially well marked on the upper surface. The surface of the wrist is quite smooth, except for two or three tiny granules along the inner edge of the upper surface. The hand is nearly as broad as long, and its inner surface is bounded by two prominent longitudinal rows of sharp-cut bead-like granules, which are continued some way along the immobile finger. The fingers are nearly as long as the hand, and are stoutly denticulate along the whole extent of their opposed edges.

The legs have the meropodites much compressed, those of the first three pairs being sharply squared, with four sharp longitudinal lines of granules, and those of the last pair being broadened and carinated ventrally as well as dorsally; the carpopodites, in all, are compressed and strongly carinate dorsally; the propodites are compressed and strongly carinate both dorsally and ventrally; and the dactyli are broadly lanceolate.

The abdomen, in the male, to external view, consists of only 3 distinct pieces, the second piece bearing a tiny denticle in the middle line.

Colours in spirit: stone blue with indefinite longitudinal stripes of darker hue; chelipeds, above, livid purplish-blue; legs yellowish.

The carapace of an adult male is 23 millim. long and 20 millim. broad; of an adult female, 21.5 millim. long and 19 millim. broad.

In the Museum collection are 2 adult males and 3 adult females from the mouth of the R. Hooghly.

## 62. *Leucosia vittata*, Stimpson.

*Leucosia vittata*, Stimpson, Proc. Acad. Nat. Sci. Philad., 1858, p. 159.

Differs from *L. craniolaris*, adults of both sexes being compared, only in the following particulars:—

1. The antero-lateral borders are distinctly emarginate behind the hepatic regions, the emargination being caused by the encroachment of the outer limb of the thoracic sinus, and being plainly visible, dorsally, when the carapace is held, without any inclination, straight in front of the observer's eyes.

2. The hand is very appreciably longer than broad, and the fingers are every bit as long as the hand.

3. The colours in spirit are: carapace blackish blue, or nearly black, with flame-coloured stripes; chelipeds from the distal fourth of the arm to near the tips of the fingers, smoky flame-coloured on both surfaces, as are also the legs; under surface of body ruddy brown.

In size similar to *L. craniolaris*.

Two adult males, an adult female, and a young female from the Andamans are in the Indian Museum collection.

In the young one the posterior margin of the carapace is perfectly straight, with the outer angles dentiform.

### 63. *Leucosia pubescens*, Miers.

*Leucosia pubescens*, Miers, Trans. Linn. Soc., Zool., (2) I. 1875-79 (1877), p. 238, pl. xxxviii. figs. 22-24: Haswell, P. L. S., N. S. Wales, Vol. IV. 1879, p. 46, and Cat. Austral. Crust. p. 119: de Man, Archiv. für Naturges. LIII. i. 1887, p. 39.  
? *Pseudophilyra hoedtii*, de Man, Notes Leyden Mus. III. 1881, p. 125.  
*Pseudophilyra hoedtii*, de Man, Journ. Linn. Soc. Zool. Vol. XXII. 1883, p. 198.

Differs from *L. craniolaris* Herbst, only in the following particulars:—

1. The front is as long as broad, and its sides meet the antero-lateral borders of the carapace at an angle.

2. The inflexed surface below the posterior margin of the dorsum of the carapace is quite smooth.

3. The thoracic sinus, when denuded of its hair, is a shallow cavity, and the edge of the pterygostomial region which bounds the sinus anteriorly is thickened, smooth, and little convex.

4. The inner edge of the hand is almost devoid of granules.

5. The meropodites of the first three pairs of legs are rounded, not sharply squared, and usually have only a single longitudinal row—ventral in position—of minute granules: those of the last pair, though compressed, are not carinate, except that ventrally, about the middle, they bear a serrated lobule.

6. The carpopodites of the legs are inflated and non-carinate, and the propodites are but slightly carinate.

7. In fresh spirit specimens the carapace is light slate blue, traversed longitudinally by four broken longitudinal stripes of greenish brown which are so far continuous as to form a treble loop something like an incomplete pair of spectacles or a rather fantastic U: the chelipeds and legs with bands of yellowish brown, and the base of the fingers yellowish brown. In old spirit specimens the markings are not found on the carapace.

The carapace of an adult male is 18 millim. long and 15 millim. broad, that of an adult female is 18.5 millim. by 15 millim.

In the Indian Museum collection are 3 adult males and 2 adult females from the Madras Coast, two adult females and a young male from the Persian Gulf, an adult and a half-grown male from the

Andamans, and young males from Palk Straits, Mergui (and Hong-kong).

The young male from Mergui has been named *Pseudophilyra hoedtii* by Dr. de Man.

64. *Leucosia truncata*, n. sp. Plate VI. fig. 6.

Differs from *L. pubescens*, ovigerous females compared, only in the following characters :—

1. The front is broad and so extremely short that its free edge does not project beyond, indeed barely projects as far as, the epistome.
2. The thoracic sinus is extremely shallow, but yet is a distinct sinus, with a row of minute granules above the base of the chelipeds.
3. The dactyli are palmulate.
4. A distinct line of sharp cut beads bounds the inner edge of the wrist and of the hand.

Two adult (ovigerous) females from the Orissa coast. The colouration is exactly similar to that of *L. pubescens*, but darker.

The first specimen that I saw I regarded, after careful examination, as either a malformation of *L. pubescens*, or a specimen of *L. pubescens* that had had its front broken and imperfectly repaired. But a second ovigerous female of exactly similar form, from another dredging station, now leads to the conclusion that, instead of being malformations, these two specimens must represent either a new species of the *L. craniolaris* and *rhomboidalis* type, or possibly may belong to the *L. porcellana* of Fabricius, which de Man states definitely is a true *Leucosia*.

At any rate the species here under consideration is a genuine *Leucosia*, and not a *Pseudophilyra* or *Philyra*.

65. *Leucosia rhomboidalis*, De Haan.

*Leucosia rhomboidalis*, DeHaan, Fann. Japon. Crust. p. 134, pl. xxxiii. fig. 5: Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 284, and Cat. Leucos. Brit. Mus. p. 6: F. Muller, Verh. Ges. Basel, VIII. p. 472: A. Ortmann, Zool. Jahrbuch. Syst. etc., VI. 1892, p. 586.

? *Leucosia craniolaris*, Desmarest, Consid. Gen. Crust., p. 167, pl. xxvii. fig. 2.

*Leucosia maculata*, Stimpson, Proc. Acad. Nat. Sci. Philad. 1858, p. 159.

Differs from *L. craniolaris* Herbst, only in the following particulars, adults of both sexes being compared :—

1. Its size is very much smaller: the carapace of the adult, in our series of 23 specimens, is never more than 16 millim., and is usually about 14 millim. long.

2. The front, which is as long as broad, has its sides subparallel

and hence forming a very abrupt angle with the antero-lateral borders of the carapace: it ends in 3 teeth, of which the two outer are small and deflexed and only the middle one is large and prominent. As, also, the external orbital angles are inconspicuous, the front, when examined without a lens, seems to end in a single sharp point, as shown in De Haan's figure.

3. The thoracic sinus, when denuded of its hair, is a shallow cavity, and the edge of the pterygostomian region that forms its anterior boundary is thickened, smooth, and almost straight.

4. The chelipeds of the adult male are less than half again as long as the carapace.

5. The inner surface of the wrist is bounded both above and below by a line of granules.

6. Colours in spirit: carapace and dorsal surface of chelipeds blue-black; the carapace with two divergent crescents of dark red spots in its anterior half, following the anterior boundary of the epibranchial regions; tips of arms hands and fingers sometimes nearly white, bases of fingers sometimes yellow.

17 adults of both sexes (including females with eggs) from the Coromandel coast in 13 to 28 fathoms, and an adult male and female from the Andamans (besides 4 adults from Hongkong) are in the Indian Museum collection.

#### 66. *Leucosia phyllochira*, Bell.

*Leucosia phyllocheira*, Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 291, pl. xxxi. fig. 5, and Cat. Leucos. Brit. Mus. p. 9.

This species has a piriform carapace, and is distinguished from all its congeners by the following characters:—

1. The chelipeds are shorter than the carapace.
2. The arms have their upper surface much expanded.
3. The hands are broader than long, are foliaceous, and have both their inner and outer edges strongly carinate.

A single small specimen from Palk Straits is in the Indian Museum collection.

#### *Onychomorpha*, Stimpson.

*Onychomorpha*, Stimpson, Proc. Acad. Nat. Sci., Philadelphia, 1858, p. 162.

Carapace shaped much like a human nail, depressed, with all its margins, behind the front, forming a continuous laminar brim, increasing in breadth from before backwards and beneath which the true legs are almost entirely concealed in flexion: the expansion of the posterior

margin is particularly broad: the regions of the carapace are not delimited. Front short, hardly projecting beyond the general outline of the carapace, but projecting well beyond the edge of the buccal cavern. Eyes minute: orbits with a long suture in the roof, and a small gap at the inner canthus, but complete and affording complete concealment to the eyes: the floor of the orbit is closely appressed to the roof of the buccal cavern. Antennules folding a little obliquely. Antennæ obsolete.

Buccal cavern longer than broad: the exopodite of the external maxillipeds is elongate, and not much broader than the endognath, and has its outer edge a little curved: the acutely triangular merus of the endognath projects beyond the exognath, and is much longer than the ischium, measured along the inner edge.

The chelipeds, compared with the legs, are very massive: they are depressed and laminar, and are about the same length as the carapace: the fingers are stout, compressed, and very short.

The legs are slender and compressed, and when flexed are almost entirely concealed beneath the expanded edge of the carapace.

#### 67. *Onychomorpha lamelligera*, Stimpson.

*Onychomorpha lamelligera*, Stimpson, Proc. Acad. Nat. Sci. Philad., 1853. p. 162: A. O. Walker, Journ. Linn. Soc. Zool. XX. 1890 (1887), p. 111, pl. viii. fig. 3.

Carapace triangular with the sides slightly curved, a little longer than broad; depressed, laminar, and unguiform owing to the preponderance of the broad laminar brim, to which the true carapace (the part lodging the viscera) forms a low convex circular crown.

The surface of the carapace is smooth, without any indication of regions: the edge of the brim is elegantly striated. The under surface of the body is also quite smooth, except for the striations all round the edge of the carapace.

The front is a little recurved upwards.

The chelipeds, in the female, are a very little longer than the carapace: the arm is sharply trigonal, with the outer edge cristiform, the edge of the crest being finely striated like the edge of the carapace: the outer edge of the wrist is carinate, and a ridge traverses the upper surface of the wrist: the hand is laminar with the edges sharp and striated beneath a copious spongy pubescence; it is rather more than half again as long as broad, and more than twice as long as the compressed fingers.

The legs are short and slender, with the merus, carpus and propodite carinated, and the dactylus almost filiform.

In the female all the segments of the abdomen except the last appear to be fused together, although the first and second can be recognized.

The carapace of an apparently adult female is 7 millim. long, and 6.5 millim. in greatest breadth.

A single female occurs in the collection of the Indian Museum,—from Palk Straits.

### *Philyra*, Leach.

*Philyra*, Leach, Zool. Miscell. III. p. 18.

*Philyra*, Milne Edwards, Hist. Nat. Crust. II. 131.

*Philyra*, Bell, Trans. Linn. Soc., Vol. XXI. 1855, p. 299, and Cat. Leucos. Brit. Mus. p. 13.

*Philyra*, Miers, 'Challenger' Brachyura, p. 320.

*Philyra* can be at once distinguished from *Leucosia* by the absence of a thoracic sinus, and from *Pseudophilypa* by the fact that the front is broad and either not at all produced to form a *Leucosia*-like snout, or if so produced (as it is, to some extent, in *Philyra platychira*) then the side-wall of either hepatic region forms an independent marginal facet.

Carapace usually circular and somewhat depressed, with the epistome projecting beyond the broad front; the dorsal surface of the carapace is generally bounded by a continuous beaded line; the hepatic and branchial regions usually fairly well defined by grooves or creases.

Buccal orifice transversely oblong, with the anterior angles broadly rounded: the exognath broadly dilated, usually foliaceous, the outer and anterior borders forming parts of one wide curve: the merus of the endognath narrowly and acutely triangular, the length of its inner border being not less, or not much less, than that of the inner border of the broad ischium.

Orbits small and sunken, with two sutures in the upper and outer wall, and a hiatus at the inner angle, where the minute antennal flagellum stands. The antennules fold transversely.

Chelipeds symmetrical and, relatively to the legs, very massive; longer in the male—about twice the length of the carapace—than in the female: true legs small.

The abdomen of the male consists of 3 or 4 pieces, that of the female of 4.

Key to the Indian species of *Philyra*.\*

- I. Carapace circular, never carinate or covered with pubescence dorsally : upper surface of chelipeds never longitudinally carinate :—
1. The epistome and the lower border of the marginal hepatic facet form a lobe that projects far beyond the front, like the lower jaw of a bulldog :—
    - i. Carapace as long as broad, its surface only partly, and very variably granular : chelipeds of adult male more than twice as long as the carapace..... *P. scabriuscula*.
    - ii. Carapace a little broader than long, its surface always completely covered—except sometimes on the tip of the front—with beadlike granules : chelipeds of the adult male much less than twice the length of the carapace..... *P. verrucosa*.
  2. The epistome projects either very slightly in all its extent, or not in its entire extent, beyond the front :—
    - i. The sidewall of the hepatic region forms, on either side, an independent facet on the antero-lateral margin of the carapace : the margin of the epistome is deeply cleft on either side, below the eye ; hands between 2 and 3 times as long as broad, fingers with their opposed edges toothless..... *P. platychira*.
    - ii. The sidewall of the hepatic regions is not flattened to form a facet : the margin of the epistome not cleft below the eye : hands never twice as long as broad, fingers denticulate :—
      - a. The carapace is almost smooth to the naked eye : the regions of the carapace are hardly defined :—
        - a. The whole of the epistome projects beyond the front, which is hardly pubescent : the beads on the line that defines the circumference of the carapace are of uniform small size : terminal segment of the exognath roughly semicircular : hands not inflated, fingers not strongly bent inwards in the male : sixth abdominal tergum quite smooth..... *P. globosa*, (Fabr.)
        - β. Only the internal angles of the afferent branchial orifices project beyond the front, which is hairy : some of the marginal granules of the carapace are enlarged and almost denticiform, at fairly regular intervals : terminal segment of the exognath ovaly, and very elegantly, foliaceous : fingers, in the male, strongly bent inwards : sixth abdominal tergum, in the male, with a small median denticle..... *P. globulosa*, Edw.
      - b. The regions of the carapace form independent swellings, the convexities of which are closely covered with large vesiculous granules..... *P. corallicola*.
- II. Carapace sharply hexagonal, the posterior margin quite straight and the posterior angles denticiform : traversed fore and aft by a median carina, and with an oblique carina on either branchial region : upper surface of chelipeds traversed—from base of arm to finger-cleft—by a sharp ridge..... *P. sezangula*.

\* Dr. Henderson includes *Philyra adamsi* Bell (Trans. Linn. Soc. Vol. XXI. 1855, p. 301, pl. xxxiii. fig. 1) in the Indian Fauna. I have not given it a place in this Key because, from the figures and description, I cannot satisfy myself that it is really a *Philyra*. It seems to me to be, rather, a *Pseudophilyra*.

68. *Philyra scabriuscula*, (Fabr.)

Seba, III. pl. xix. figs. 10, 11.

? *Cancer cancellus*, Herbst, Krabben, I. ii. 94, pl. ii. fig. 20.

*Leucosia scabriuscula*, Fabricius, Ent. Syst. Suppl. p. 349: Latreille, Hist. Nat. Crust. et Ins. VI. 116.

*Philyra scabriuscula*, Leach, Zool. Miscell. III. p. 22: Desmarest, Consid. Crust. p. 167: Milne Edwards, Hist. Nat. Crust. II. 132, pl. xx. figs. 9, 10: Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 299, and Cat. Leucos. Brit. Mus. p. 14: Heller, 'Novara' Crust. p. 70: de Man, Notes Leyden Mus. III. 1881, p. 126: Lenz and Richters, Abh. Senck. Ges. XII. 1881, p. 425: Muller, Verh. Ges. Basel, VIII. 1886, p. 473: de Man, Journ. Linn. Soc., Zool., Vol. XXII. 1888, p. 201: J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 399.

The epistome and the subhepatic regions form a dorsally-flattened, marginally-crenulate, rounded lobe, which is separated from the anterior curve of the carapace by a groove and projects far beyond the front, like the lower jaw of a bulldog.

The carapace is discoidal, with the margin beaded and the dorsal surface very variably ornamented with vesicular granules visible to the naked eye: these, however, never completely cover the carapace, and are rarely altogether absent, but are generally confined to the outer part of the branchial regions and to the branchio-cardiac grooves, which are broadly defined. The hepatic regions also are defined, by a slight marginal indentation and by a dorsal wrinkle.

The front is divided into two lobes by a deep broad groove, and the roof of the orbit is deeply fissured, so that the external orbital angle is acutely emphasized.

The edges of the thoracic sterna and the basal edge of the abdomen, as well as the greater part of the pterygostomian regions, are ornamented with polished granules; but the surface of the external maxillipeds is perfectly smooth, except in the female, where there are traces of granulation on the endopodite.

The chelipeds in the adult male are about  $2\frac{1}{2}$ , in the adult female about  $1\frac{2}{3}$ , times the length of the carapace: the arms bear rows of beadlike granules running along the upper and inner surfaces but fading away distally; the under surface of the arm is almost smooth: the inner edge of the wrist has a single row, and the inner edge of the hand several rows, of minute vesicular granules, which are hardly visible to the naked eye even in the male, and are obsolescent in the female. The hands are twice as long as broad: the fingers, although they meet only at their extreme tip, are denticulate all along the opposed edges; the mobile finger is nearly as long as the hand.

The legs are slender and smooth, except for a line of microscopic granulation along the under surface of the meropodites.



The abdomen of the adult male consists of two linear and hidden basal pieces, a triangular apical piece, and a long triangular middle piece in which the division of the 6th tergum is marked by a faint transverse groove.

The diameter of the carapace of the adult male is 12 to 14 millim., of the adult female about 10 millim.

Colours in spirit: carapace mottled with dull brown and greenish shades; chelipeds distinctly and legs indistinctly banded with dull brown.

In the Indian Museum collection are 110 specimens from Tavoy, Mergui, Madras coast, Travancore coast, Karáchi, Mekrán coast, and Persian Gulf.

1. A variety from Madras—represented by a single male—has the greater part of the carapace covered with granules, four of which—one in the mid-gastric, one in the mid-cardiac, and one on either branchial region—are much enlarged; and has chelipeds a good deal less than twice the carapace in length.

2. A variety from the Nicobars—also represented by a single male—has the whole carapace, except the front and the anterior limit of the gastric region, very closely covered with large granules much as in the next species.

#### 69. *Philyra verrucosa*, Henderson.

*Philyra verrucosa*, Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 399, pl. xxxvii. figs. 10-12.

Differs from *P. scabriuscula*, (Fabr.), adults of both sexes being compared, only in the following characters:—

1. The carapace is irregularly oval rather than discoidal, especially in the female, owing to the greater lateral bulging of the branchial regions.

2. The whole dorsal surface of the carapace, except sometimes the front, is closely covered with beadlike granules, which are larger posteriorly, and one of which—somewhere near the middle—is usually enlarged.

3. A slight transverse dorsal indentation separates the hepatic from the branchial region on either side, but there is no independent dorsal bulging of the latter.

4. The branchio-cardiac grooves are narrow and deep.

5. The front is divided into two lobes by a broad shallow groove: the fissure in the roof of the orbit is indistinct, so that the external orbital angle is not sharply pronounced.

6. The whole surface of all the thoracic sterna is closely beaded, and the surface of the exopodite as well as of the outer half of the endopodite of the external maxillipeds is granular.

7. The chelipeds, in the adult male, are less than twice the length of the carapace: the distal end of the upper surface of the arm is covered with granules, and the greater part of the under surface of the arm is granular: the wrist and hand of the male have, along their inner edge, a row of granules quite visible to the naked eye: the hand is only half again as long as broad.

8. The size is a good deal smaller—the carapace of the adult male being about 9 millim. long and 10 millim. broad, that of the adult female being about 8 millim. long and 9 millim. broad.

9. Colours in spirit: dorsum blue-black, with a coppery tinge which is most marked on the chelipeds.

12 adults (male and female) from off Puri, 10 fathoms, from Madras, and from Karáchi, are in the Indian Museum.

70. *Philyra sexangula*, n. sp. Plate VII. fig. 2.

The whole exoskeleton, excluding the tips of the fingers and dactyli, is closely covered with a short close microscopic velvet-like pubescence—both dorsally and ventrally.

Carapace as long as broad, sharply hexagonal, traversed fore and aft by an interrupted median carina: the branchial regions are also traversed obliquely backwards each by a carina which terminates on either postero-lateral margin at a sharp eminence. The straight posterior margin has its outer angles strongly dentiform.

The side wall of either hepatic region forms an independent facet, which also involves the front and thus presents a condition intermediate between that of *P. platychira* and *P. scabriuscula*.

The edge of the front is straight and bilobed, and the straight edge of the epistome projects beyond it. There is a slight notch in the edge of the epistome beneath the eye on either side.

The chelipeds in the adult male are nearly  $2\frac{1}{2}$  times as long as the carapace; their upper surface, from the base of the arm to the finger cleft, is traversed by a sharp ridge; they are devoid of any granules visible through the general velvet: the hand is twice as long as broad, and the fingers are rather over two-thirds the length of the hand and have their opposed edges finely denticulate and hairy: the inner edge of the upper surface of the hand is traversed by a second sharp ridge.

The legs are slender and compressed, the under edge of their propodites and dactyli being fringed with long hairs.

The abdomen of the male appears to consist of only two pieces, namely a small apical piece, and a long triangular plate in which the 6th tergum is marked off by a groove and bears a strong median tooth.

The diameter of the carapace of the male is 8 millim.

Colours uniform blackish brown everywhere above and below.

*Loc.* Godávari coast, Sacramento shoal, 6 fms., a single male : and Persian Gulf, a male.

In the specimen from the Persian Gulf the surface of the carapace beneath the velvet-like pubescence is uniformly punctulate in honey-comb fashion ; and the edges of the carapace, the epibranchial carinæ, and the edges of the chelipeds and of their longitudinal ridge, as also of the second ridge along the inner edge of the hand, are all evenly granular. A near ally of this little species appears to be *P. punctata*, Bell.

### 71. *Philyra platychira*, De Haan.

*Philyra platychira* De Haan, Faun. Japon. Crust. p. 132, pl. xxxiii. fig. 6 : Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 300, and Cat. Leucos. Brit. Mus. p. 15 : Stimpson, Proc. Acad. Nat. Sci. Philad. 1858, p. 160 : E. Nauck, Zeits. Wiss. Zool. XXXIV. 1880, p. 49 (*gastric teeth*) : Miers, 'Challenger' Brachyura, p. 321 : de Man, Journ. Linn. Soc., Zool., XXII. 1889, p. 201 : J. R. Henderson, Trans. Linn. Soc. Zool., (2) V. 1893, p. 400.

*Philyra longimana*, A. Milne Edwards, Nouv. Archiv. du Mus. X. 1874, p. 43, pl. ii. fig. 4 : Miers, 'Challenger' Brachyura, p. 321.

Carapace convex, subcircular, but pinched in to form an independent marginal facet in either hepatic region : the circumference is beaded, as also—but less distinctly—are the margins of the lateral hepatic facets : the surface of the carapace, to the naked eye, is almost always quite smooth : the branchio-cardiac grooves are distinct.

The edge of the front is almost straight and is broadly bilobed, the whole of the epistome projects beyond it. The edge of the epistome is deeply cleft just below the eye, on either side.

The thoracic sterna have the edges, and the first sternum the surface also, beaded or granular.

The external maxillipeds have the surface smooth, and the edges of certain of their segments finely and inconspicuously fringed as in *P. globosa* (Fabr.), only the hairs on the inner edge of the endognath of the female being conspicuous : the distal segment of the exognath is less dilated than in any other Indian species.

The chelipeds in the adult male are  $2\frac{1}{2}$  times, in the adult female  $1\frac{1}{2}$  times, the length of the carapace : the arms have a few rather distant small vesicular granules on the basal third of, and also along the inner border of, the upper surface, and on the base and along the lower border of the inner surface, besides other tiny granules only visible with a lens : the surfaces of the wrist and hand are smooth. The hand is thin—

almost lamellar—with sharp edges, the inner of which is finely crenulate; in the adult male its length is nearly three times its breadth. The fingers, which are not as long as the hand, are also very thin and lamellar, and are elegantly curved: their opposed edges are sharp and entire, the cutting edge of the immobile finger being rather thickly fringed with hair.

The legs are slender and smooth, except for a line of tiny granules along the under surface of the meropodites.

The abdomen of the male consists of a single linear and concealed basal piece and a small triangular terminal piece, and, between the two, a long smooth triangular piece, which is bilobed and granular at base and has the sixth tergum demarcated by a deep groove.

The colour in spirit is uniform coppery.

The carapace of the adult male is 13 or 14 millims. in either diameter, that of the female 12 or 13.

In the Indian Museum collection are 40 specimens, adults and young of both sexes, from the Andamans, Mergui, Karáchi, and the Persian Gulf.

The Persian Gulf specimens, which are quite adult, have the dorsal surface much mottled with green and brown, and the immobile finger denticulate beyond the line of hair.

## 72. *Philyra globosa*, Fabr., de Man.

*Philyra globosa*, de Man, Journ. Linn. Soc., Zool., Vol. XXII. 1898, p. 202: only that part referring to Fabricius' female type and to the Mergui specimens. This reference is placed first because Dr. de Man has examined Fabricius' types, male and female, of *P. globosa*, and the species here under consideration corresponds with Fabricius' female type as re-described by de Man.

?? Rumph, Amboin. Rariteitk. pl. x. fig. D.

*Cancer globosus*, Fabr., Sp. Insect. I. 497 and Ent. Syst. II. 441.

? *Cancer globus*, Herbst, Krabben, I. ii. 90.

*Leucosia globosa*, Fabr. Ent. Syst. Suppl. p. 349: Latreille, Hist. Nat. Crust. et Ins. VI. 117.

? *Philyra globosa*, Leach, Zool. Miscell. III. 22 (reference to male); and (?) Desmarest, Consid. Crust. p. 169.

? *Cancer porcellaneus*, Herbst, Krabben I. ii. 92 (*nec syn.*), pl. ii. fig. 18.

*Philyra porcellana*, Milne Edwards, Hist. Nat. Crust. II. 133: Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 303, and Cat. Leucos. Brit. Mus. p. 14 (*nec syn.*)

*Philyra polita*, Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 401, pl. xxxviii. figs. 1-3.

The whole exoskeleton (when not incrustated with *Hydrozoa*, &c., as it commonly is) has, to the naked eye, the appearance of glazed porcelain, although when examined with a lens it is minutely punctulate and granular.

The carapace is subcircular, the anterior portion being an arc of a smaller circle than the posterior; its dorsum is defined all round, behind the hardly at all pubescent front, by a line of fine beads all of equal size.

The epistome projects well beyond the edge of the front, which is deflexed, the deflexed portion being slightly acuminate downwards in the middle line.

None of the regions of the carapace are in any way defined.

The thoracic sterna and the base of the abdomen are bordered by granules, which are flattened and depressed.

The surface of the external maxillipeds is quite devoid of hair, though the edges of the exopodite have a fringe of exceedingly short hair, and the inner edge of the endopodite is, in the female, fringed with hair that is somewhat longer. The expanded exopodite is very broad anteriorly and has the inner edge quite straight (not curved)

The chelipeds in the adult male are a little more than twice the length, in the adult female about  $1\frac{3}{4}$  times the length, of the carapace. The arms are covered with close-set flattened pearly granules on the upper surface except near the tip, on the whole of the inner surface, and on the basal half or third of the under surface. The wrist and hand are quite smooth, and only very occasionally in old males the inner surface of the hand is, under the lens, but not to the naked eye, roughened. The hand in both sexes is a little more than half again as long as broad, and is not inflated.

The fingers have much the same form in both sexes: they are almost in the same straight line with the hand; they meet closely only at tip, although they are faintly denticulate along the greater part of their extent; they do not, in the male, bear any enlarged dentiform tubercle; and the length of the dactylus is hardly greater than that of the outer border of the hand.

The true legs are not much longer than the male arm; their meropodites have every surface quite smooth, their propodites are bluntly carinate, and their dactyli lanceolate.

The abdomen of the male consists of two linear basal pieces and a triangular apical piece, and, between the two, a long narrow triangular plate which has no median denticle and is divided by a transverse groove of no great depth.

Colours in spirit: smoky bluish brown above, the blue deepest on the carapace.

The diameter of the carapace of the adult male does not exceed 20 millim., that of the adult female does not exceed 17 to 18 millim.

In the Indian Museum collection are 110 specimens, both young and adult, of both sexes, from the East coast, from the mouth of the Hooghly to Madras—and also from Karachi.

Besides these there are 4 specimens (two males more than half-grown, a younger male, and one very young specimen) from Mergui. These have been compared by Dr. de Man with Fabricius' types of *P. globosa* from the Kiel Museum, and are stated by him to agree with Fabricius' female type.

They do not however, as Dr. de Man appears to suspect, agree with Fabricius' male type, and this involves a delicate question of synonymy.

From Dr. de Man's description it is evident that Fabricius' male is a species quite distinct from his female: as a matter of fact it appears to be the species named by Milne Edwards—and named probably with foresight—*P. globulosa*.

It seems therefore preferable to apply Milne Edwards name, *P. globulosa*, to Fabricius' male type, and to leave the name *P. globosa* in possession of Fabricius' female type.

The only other alternative is to make use of Dr. Henderson's name *P. polita* for Fabricius' female, and to let *P. globosa* stand for Fabricius' male. But this, I think, would be a little unjust to Dr. de Man, upon whose prior work the present attempt to clear up the confusion between the two species is based, and a little wanting in respect to the memory of the founder of modern carcinology.

### 73. *Philyra globulosa*, Edw.

?? *Cancer anatum*, Herbst, Krabben, I. ii. 93, pl. ii. fig. 19.

*Philyra globulosa*, Milne Edwards, Cuvier Règne An. Crust. pl. xxiv. fig. 4, and Hist. Nat. Crust. II. 132 (*nec syn.*): Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 300, and Cat. Lencos. Brit. Mus. p. 14 (*nec syn.*)

? *Philyra globosa*, Leach, Zool. Miscell. III. p. 22 (female only): ? Desmarest, Consid. Crust. p. 163 (part).

*Philyra globosa*, de Man, Journ. Linn. Soc., Zool., Vol. XXII. 1888, p. 203: only that part relating to Fabricius' male type, and not the part relating to Fabricius' female type and to the Mergui specimens.

? *Philyra heterograna*, Ortmann, Zool. Jahrbuch. Syst. etc. VI. 1892, p. 582, pl. xxvi. fig. 17, (half-grown male).

The whole exoskeleton (when not incrustated with *Hydrozoa* &c., as it rarely is) has the somewhat greasy look and feel of unglazed porcelain, except the legs and abdomen, which are polished.

The carapace is circular, its dorsum is defined all round, behind the hairy front, by a line of granules, some of which, at fairly regular intervals, are much enlarged and may even, in young specimens, form distinct denticles.

The epistome can be scarcely said to project beyond the front, since only the inner angles of the afferent branchial canals do so.

The edge of the front is emarginate in the middle line, so as to make the front, when denuded of hair, broadly bilobed.

An indentation of the margin of the carapace separates the hepatic from the branchial regions, and a broad groove separates the branchial regions from the cardiac and intestinal regions, on either side.

A baud of granules visible to the naked eye is always found

on either pterygostomian region, bounding the buccal cavern; and almost always in females and young males, and often but by no means always in adult males, the hepatic regions and the outer and posterior parts of the epibranchial regions are distinctly granular to the naked eye.

The exposed parts of the thoracic sterna are more or less covered with granules, and there are granules on the base of the abdomen. But the greater part of the abdomen, in contrast with the sternum, is polished.

The edges of the maxillipeds are hairy in the same manner as, but much more coarsely than, those of *P. globosa* Fabr., and the surface also is in large part covered with hair: the foliaceous exopodite has an elegantly oval shape, owing to the fact that its inner edge is curved and enters the common curve of the outer and anterior edges without any abrupt transition.

The chelipeds in the adult male are a little more than twice the length, in the female only about  $1\frac{1}{2}$  times the length, of the carapace. The arms bear numerous sharpish granules (speaking of those visible to the unaided eye alone) on the basal third (male) or basal half (female) of the upper surface, all along both the inner and outer borders of the upper surface, and on the basal third and inner border of the lower surface. The wrist has a row of granules along the upper border of its upper surface, and commonly also along the under border of the same surface; and the inner surface of the hand is defined above by a row of prominent granules, and below by several lines of smaller granules—all continued on to the base of the immobile finger, and all being very much less distinct in the female than in the male. The fingers are fluted, with the outer borders granular at base. The hand in the female is hardly longer, and in the male is only about one-fifth longer, than broad, and is considerably inflated. The fingers differ considerably according to sex, but both sexes agree in having the dactylus very markedly longer than the outer border of the hand, in the male they are bent inwards at an angle of about  $145^\circ$  with the hand, and the edge of the basal half of the dactylus is a good deal hollowed to make room for a strong dentiform tubercle on the opposed edge of the immobile finger; and it is only beyond this tubercle and its corresponding hollow that the fingers are denticulate: in the female the fingers are not bent inwards strongly, and their opposed edges are unbroken, and are denticulate in the greater part of their extent.

The true legs resemble those of *P. globosa*, except that (1) the under surface of the meropodites is granular—a line of granules on

the first pair, in the male only, being much enlarged, and (2) that the dactyli are distinctly palmulate.

The abdomen of the male consists of a single linear basal piece and a triangular apical piece, and, between the two, a long triangular plate which is divided in its distal fourth by a deep transverse groove, the piece so cut off bearing a median denticle in its distal half.

Colours in spirit: light yellowish-pinkish-brown to coppery, with a bluish tinge over a large part of the dorsum of the carapace.

The diameter of the carapace of the adult male is 29 to 30 millim., that of the adult female 22 to 24 millim.

In the Indian Museum collection there are 160 specimens collected all along the East coast, from the mouth of the Hooghly to Point Calimere, and on the coasts of Travancore, the Andamans, and the Persian Gulf.

74. *Philyra corallicola*, n. sp. Plate VII. fig. 1.

Carapace perfectly circular, convex: the hepatic regions form a pair of distinct dorsal swellings, and the branchial regions are separated from the median regions by deepish grooves: the summits of the hepatic regions, the posterior part of the gastric region, and the convexities of all the other regions are closely covered with vesiculous granules like those of *P. verrucosa*, but the grooves and hollows of the carapace are quite smooth. The front is divided longitudinally, from edge to base, into two tumid lobes by a deepish groove: its edge is straight and the tips of the mouth-parts can only just be seen beyond it in a dorsal view. The entire margin of the carapace is finely evenly and sharply crenulate. The sternum and convexities of the pterygostomial regions are finely granular, as are also the outer and distal parts of the external maxillipeds.

The external maxillipeds are shaped as in *P. globulosa*, Edw.

The chelipeds in the male are about  $1\frac{1}{4}$  times the length of the carapace: the arm is closely covered, everywhere except on a distal patch of the inner surface, with vesiculous granules, which are largest on the upper surface: the wrist and hand are finely granular; there is a raised row of granules on the outer edge of the wrist, which becomes a granular crest on the outer edge of the hand; and there are two raised rows of granules along the inner surface of the hand: the fingers are about as long as the hand. The abdomen of the male consists of 3 pieces, the broad base of the long triangular second piece being granular: at the distal end of the second piece is a stout denticle.



Diameter of the carapace of an apparently adult male, 6 millim.

Loc. off Malabar Coast, 29 fms. on a bottom of "hard flat coral slabs" (Alfred Carpenter).

At first sight this species resembles *P. verrucosa*, Henderson, from which it is easily distinguished on close examination.

### *Pseudophilypa*, Miers.

*Pseudophilypa*, Miers, P. Z. S., 1879, p. 40.

Of the small forms grouped together in the genus *Pseudophilypa* some present the greatest resemblance to the smaller species of *Leucosia*, and others to the smaller species of *Philypa*. All, however, may be distinguished from *Leucosia* by the absence of any trace of a "thoracic sinus"; and all may be distinguished from any Indian species of *Philypa* by the following characters:—(1) either the whole free edge of the front, or at least the tip of its median tooth, projects beyond the level of the epistome; (2) the buccal cavity is either longer than broad and shaped as in *Leucosia*, or only a very little broader than long; (3) the exognath of the external maxillipeds is never broadened, and never has the outer and anterior borders forming one unbroken sweep; (4) the front has always the form of a distinct snout, convex, and pinched off, at base, from the hepatic regions. Now in the only Indian species of *Philypa* in which this to some extent occurs, the side wall of either hepatic region forms an independent marginal facet to the carapace—a thing never seen in *Pseudophilypa*.

The whole exoskeleton porcellaneous.

Carapace subcircular or subpiriform, convex, with the regions usually not defined; produced in front to form a short upturned snout, similar in all its relations except length to that of *Leucosia*. The carapace is defined all round behind the front by a continuous raised and usually beaded line: its epimeral edge is not appreciably thickened, and is not approximated to the true lateral margin, so that there is no infolding of the lateral wall of the carapace or "thoracic sinus": nor is the epimeral edge of the carapace continuous with the line that defines the dorsum of the carapace posteriorly, as it is in *Leucosia*.

The buccal cavern is truncate-triangular: its length is usually greater than, but sometimes slightly less than its greatest breadth: the outer margin of the exognath meets the anterior margin abruptly, the exognath not being dilated.

The chelipeds are symmetrical and, relatively to the legs, very massive: in the male they are nearly twice the length of the carapace: a large part of the surface of the arms is ornamented with beadlike and vesicular granules: the hands are broad, but usually not so broad as long: the fingers are usually somewhere about the same length as the hand.

The abdomen of the male usually consists of 4 pieces, but the two

basal pieces are usually linear and hidden. The abdomen of the female consists of 3 or 4 pieces.

*Key to the Indian species of Pseudophilypira.*

- I. Front tridentate, the whole of its free edge projecting well beyond the epistome: carapace strongly convex: buccal cavern elongate, truncate-triangular, quite as in *Leucosia* :—
  1. Carapace closely and coarsely punctulate: hepatic regions defined: thoracic sterna of male normal ... .. *P. tridentata.*
  2. Carapace smooth and polished: third thoracic sternum of male with two processes or teeth,—one on either side of the abdomen :—
    - i. Hepatic regions defined: hands longer than broad: processes of third thoracic sternum stout, and projecting only on to the second sternum ..... *P. pusilla.*
    - ii. Hepatic regions not defined: hands as broad as long: processes of third thoracic sternum laminar, and projecting well on to the first sternum ... *P. wood-masoni.*
- II. Front divided almost from the base by a deep longitudinal groove, its free edge straight and projecting just beyond the epistome: carapace strongly convex, with most of the regions well defined and tumid; the branchial, cardiac, post-gastric, and to a less extent the hepatic regions are, at any rate in the male, conspicuously granular in their tumid portion: buccal cavern a little broader than long ..... *P. blanfordi.*
- III. Front with a single median tooth, the tip of which alone projects beyond the epistome: carapace moderately convex, with the hepatic regions defined: buccal cavern as long as broad ..... *P. melita.*

75. *Pseudophilypira tridentata*, Miers.

*Pseudophilypira tridentata*, Miers, P. Z. S. 1879. pp. 20, 41, pl. ii. fig. 4.

Carapace subpiriform, its dorsum coarsely closely and uniformly punctulate everywhere except near the tip of the front, and defined all round behind the antero-lateral margins by a minutely-beaded line.

The front projects well beyond the margin of the buccal cavern and ends in three laminar teeth, the middle one of which is much the largest. The external orbital angles are acute, but do not reach the level of the frontal teeth. Posteriorly the frontal region extends straight backwards, between the hepatic regions, as a ridge, which is particularly conspicuous in the male. On either side of this ridge the hepatic regions are much depressed, but behind the depressions they form distinct mamillary elevations.

In the male the anterior and lateral margins of the sternum are indistinctly punctate, and the edges of the fossa in the first segment that lodges the tip of the abdomen are very finely beaded: in the female only the front border of the sternum is punctulate.

The chelipeds in the adult male are about  $1\frac{3}{4}$  times the length of the carapace: the upper surface of the arm is irregularly granular in its basal half, punctulate in its distal half; the inner surface is covered with tiny vesicular granules in its basal half, the under surface is smooth: the wrist and hand are smooth, the hand about half as long again as broad: the fingers, which are as long as the hand is broad, meet only at tip and have the opposed edges almost smooth.

The first pair of true legs exceed the arms in length by almost the last two joints.

The male abdomen is narrow and triangular and consists of 4 pieces, but the two proximal pieces are linear and concealed: the long third piece has a median tooth near the distal end.

The carapace of the male measures 10 by 8 millim., that of the female 11.5 by 10 millim.

Colours in spirit: pinkish grey mottled with reddish and yellowish brown; spotted cross-bands of brown on arms and hands, and a cross-band of reddish brown on the fingers.

In the Indian Museum collection are two adult males and four adult females from the Persian Gulf.

76. *Pseudophilypira wood-masoni*, n. sp. Plate VI. fig. 3.

Carapace subpiriform, perfectly smooth and polished, its dorsum defined all round behind the hepatic regions by a faintly raised, smooth (microscopically granular) line.

The front projects beyond the margin of the buccal cavern and ends in three teeth of nearly equal size, but it is not prolonged backwards as a ridge between the hepatic regions. The external orbital angles are not acute.

The hepatic regions have no convexity distinct from the general convexity of the carapace.

In the male the third thoracic sternal segment is produced, on either side of the abdomen, to form a laminar tooth which projects forwards, across the second segment, well on to the first. And the margins of the fossa in which the tip of the abdomen is lodged are finely beaded.

The chelipeds in the adult male are twice the length of the carapace, and are exceptionally massive—the arm being between a half and a third as broad as long: the arm has its inner border and proximal half of upper surface beaded, its inner surface completely covered with vesicular granules, and its under surface smooth: the wrist and hand are quite smooth, the hand of the adult male being as broad as long: the fingers are stout, as long as the hand, and meet only at tip: the dactylus in the male has one of its teeth—situated near the middle—of very conspicuous size; the fingers in the female are without teeth.

The true legs exceed the arm in length almost by their last two joints.

The male abdomen resembles that of the last species, and its long second piece has a stout tooth at its extreme distal end.

The carapace of the male measures 7.5 by 6.5 millim., that of the female 8 by 7 millim.

Colours in spirit: uniform yellowish pinkish brown.

In the Indian Museum collection are 2 males (one adult) and 6 females (four ovigerous) from the Andamans, and an adult male from off Cape Comorin, 39 fathoms.

#### 77. *Pseudophilyra pusilla*, Henderson.

*Pseudophilyra pusilla*, Henderson, Trans. Linn. Soc. Zool. (2) V. 1893, p. 398, pl. xxxvii. figs. 13–15.

Differs from *Pseudophilyra wood-masoni* in the following particulars only:—

1 Its size is even more diminutive, the carapace of the largest male in the Indian Museum—an undoubted adult—measuring 6 by 5 millim.

2. The edge of the front is straight, slightly deflexed and concave in the middle line, this deflexed portion being again produced horizon-

tally forwards as a median tooth. Posteriorly a faint carina runs straight backwards from the front, separating the hepatic regions, much as in *P. tridentata*.

3. The tooth on the third thoracic sternum, on either side of the abdomen, though more outstanding, is much shorter, projecting forwards only about halfway across the second sternum.

4. The chelipeds of the adult male are not more massive than usual, the arms being only about a quarter as broad as long, and the hands being more than half again as long as broad.

5. The fingers in the adult male, as in the female, are almost smooth, and there is no big tooth near the middle of the mobile finger.

6. There is but the faintest trace of a denticle on the male abdomen, in the middle line.

7. The colours are altogether different, even in a specimen that has been over 20 years in spirit in the same bottle with specimens of *P. wood-masoni*.

In good spirit specimens the dorsal surface is light grey with elegantly speckled markings of various shades of greenish and yellowish brown, as follows:—a band across the tip of the front: a V-shaped collar at base of front: a crescent on either branchial region, joining a stripe down the middle of the postgastric and cardiac regions, the whole looking like a scorpion with extended chelæ: a broad band across middle of arm and a narrow band across distal end of arm: a broad band across middle of hand, and a narrow stripe along both fingers. The ventral surface of the external maxillipeds and the tip of the abdomen closely speckled and mottled with dark brown.

Locality—Andamans, whence the Indian Museum collection has 3 adult males.

The foregoing three species have more the general facies of *Leucosia* than of *Philyra*.

#### 78. *Pseudophilyra blanfordi*, n. sp. Plate VI. fig. 7.

Carapace circular, its dorsal surface defined all round behind the eyes by a finely beaded line; its regions are tumid and well demarcated, the tumid surfaces being very distinctly granular (excepting the front part of the gastric region) in the male, but in the female more punctate than granular. The front is distinctly pinched off at base from the hepatic regions, as in all the species of *Leucosia* except *L. truncata*, and as in all other species of *Pseudophilyra*: it is divided into two rather tumid lobes by a longitudinal groove that extends almost to its base: its anterior edge is straight, and projects just beyond the edge of the epistome.

In the male the whole surface of the sternum, except the segment belonging to the external maxillipeds, as also the pterygostomial region and extreme base of abdomen, is finely beaded, and the surface of the exognath is granular: in the female the outer border of the endognath also is granular, and the basal abdominal terga.

The exognath is not dilated in any part, and the buccal cavern is narrowed in front and is at least as long as broad.

The chelipeds in the male are less than twice, though more than  $1\frac{1}{2}$  times, the length of the carapace; in the adult female they are not much longer than the carapace. The arms are cylindrical and are roughly granular everywhere except a very small part of the under and of the inner surface. The upper surfaces of the wrist and hand are slightly granular along the inner half. The hand is not greatly longer than broad. The fingers are as long as the hand, and are strongly bent inwards, much as in *Philyra globulosa*, Edw. On the immobile finger in the male there is a strong tooth, and on the opposed edge of the mobile finger a notch, beyond which the opposed edges are denticulate.

The abdomen of the male consists of 3 pieces, including a linear basal piece and a small apical piece: on the large middle piece the 6th tergum is marked by a shallow groove, and bears a stout median tooth at its distal border.

Diameter of carapace of male between 7 and 8 millim., of female the same.

Two males and four ovigerous females from the Mekrán Coast, 25 fathoms.

This little species bears a considerable resemblance to *Philyra adamsii*, Bell; but may be distinguished by its perfectly circular and strongly convex carapace, by its short chelipeds, and by the stout tooth on the abdomen of the male.

#### 79. *Pseudophilyra melita*, de Man.

*Pseudophilyra melita*, de Man, Journ. Linn. Soc. Zool., Vol. XXII. 1888, p. 199: J. B. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 397.

Carapace in the adult almost circular, moderately convex; its dorsal surface defined all round, behind the front, by an elegantly beaded line; its surface, to the naked eye, smooth and polished.

The hepatic regions are defined by a slight dorsal acuminate bulge, or wrinkle.

The anterior margin of the front, which does not reach the level of the anterior margin of the buccal cavern, is concave and deflexed in the middle line, so as to appear somewhat bilobed, but the deflexed

concave portion is horizontally produced to form an acute tooth, the tip of which projects beyond the margin of the buccal cavern.

In the male the sternum is elegantly beaded along the anterior and lateral borders, and round the line of contact with the tip of the abdomen: in the female only the anterior border is beaded.

The chelipeds in the adult male are nearly twice the length of the carapace: the arms are cylindrical, and have the upper surface in its proximal half or two-thirds beaded in longitudinal lines; the under surface is granular, except at the distal end and along the outer border: wrist smooth: hand half again as long as broad in the adult male, about twice as long as broad in the female; its inner surface, in old males only, with numerous vesicular granules: fingers in both sexes as long as the hand is broad, meeting only at tips, and having the opposed edges distantly and inconspicuously dentate.

The first pair of true legs exceed the arm in length by their dactylus.

The abdomen of the male is narrowly triangular, and is devoid of any median denticle: it consists of 5 pieces, but the joint between the 3rd and 4th pieces is rigid.

The carapace of the male is 11 millim. long and 10 millim. broad; that of the female is slightly larger.

Colours in spirit: pearly grey with numerous darker mottled markings. The confluent gastric and cardiac regions are defined by a brown line, which forms with an ill defined ring of the same colour on either branchial region a pair of spectacles; the hepatic regions edged with brown: broad cross-bands of brown across middle of arm, base of hand, and middle of fingers; wrist brown: legs with yellowish brown cross-bands.

Common along Coromandel coast. Also from Mergui.

This species has more the facies of *Philyra* than of *Leucosia*.

### *Myrodes*, Bell.

*Myrodes*, Bell, Trans. Linn. Soc. Vol. XXI. 1855 p. 298, and Cat. Leucos. Brit. Mus. p. 13.

*Myrodes*, Miers, 'Challenger' Brachyura, p. 297.

Closely resembles *Myra* in all details of form, but differs conspicuously in the following characters:—

(1) the chelipeds are much shorter, their length being hardly  $1\frac{1}{2}$  times that of the carapace:

(2) the hands are not  $\frac{1}{4}$  longer than broad and are inflated and subglobular:

(3) the fingers are much longer than the hand, are extremely slender and not much compressed, and are of about the same diameter

from their base to near their hook-like tip: the tip of the dactylus moves through an arc of over  $120^{\circ}$ .

(4) the merus of the external maxillipeds is hardly more than half the length of the ischium measured along its inner border.

#### 80. *Myrodes eudactylus*, Bell.

*Myrodes eudactylus*, Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 299, pl. xxxii. fig. 6, and Cat. Leucos. Brit. Mus. p. 13.

*Myra eudactyla*, A. Milne Edwards, Nouv. Archiv. du Mus. X. 1874, p. 46, pl. iii. fig. 3: Haswell, Cat. Austral. Crust. p. 123.

*Myrodes gigas*, Haswell, P. L. S., N. S. Wales, Vol. IV. 1880, p. 52, pl. v. fig. 5.

*Myrodes eudactylus*, Miers, 'Challenger' Brachyura p. 298: A. Ortmann, Zool. Jahrbuch., Syst. etc., VI. 1892, p. 576.

Carapace convex, longitudinally-ovoidal, with a carina—indistinct or obsolete in large adults—down the middle line; its surface generally smooth to the naked eye in large adults, but with numerous scattered bead-like granules in the young; its short posterior margin with a petaloid tooth at either end, and overhung in the middle line by a horizontal recurved spine; its lateral margins defined by a finely-beaded line.

The front is truncated and broadly bidentate, and the subhepatic region forms an independent facet, the raised pterygostomial edge of which ends posteriorly at a sharp tooth. Between the hepatic and branchial regions, on either side, is a shallow notch which is in continuity with a longitudinal groove in the side wall of the carapace.

The external maxillipeds are closely scabrous, especially distally.

The chelipeds are hardly  $1\frac{1}{2}$  times the length of the carapace (without spine), and though generally smooth to the naked eye in the adult, have, in the young, the base of the arm, the outer edge of the wrist, hand and dactylus, and the inner two-thirds of the upper surface of the hand finely but distinctly granular: the arm is subtrigonal, and the hand subglobular but much smaller at the distal end than at the base: the fingers are slender and hook-like, much longer than the hand, finely granular, of almost the same diameter from the base to the hook-like tip, and are armed on the opposed edges with fine teeth with larger lancet-like teeth at distant intervals: the movable finger opens in a horizontal plane, but it moves through an arc of between  $120^{\circ}$  and  $130^{\circ}$ .

The legs are slender, and have both edges of the dactylus, and the dorsad edge of the propodite, fringed with close shortish stiffish hairs.

The abdomen of the male is four-jointed, the penultimate piece carrying a subterminal denticle: that of the female consists of 5 separate pieces.



Numerous specimens—adults and young of both sexes—from the Andamans.

*Iphiculus*, Adams and White.

*Iphiculus*, Adams and White, 'Samarang' Crustacea p. 57.

The whole body and its appendages, except only the fingers, covered with a dense spongy or woolly tomentum, beneath which, when denuded, the surface is rough granulous or pustulous, and beneath which the regions of the carapace—especially the cardiac and intestinal—are demarcated by grooves.

Carapace transversely somewhat oval, its lateral margins spinate.

The front is narrow and is sunk behind the level of the edge of the buccal cavern, and appears still more sunken because the hepatic and sub-hepatic regions are puffed out beyond it at the sides and in front.

The orbits are obliquely elongate and completely conceal the eyes, in the denuded carapace three sutures can be made out in the emarginate roof. There is a gap at the inner canthus in which stands the basal joint of the antenna, the largish flagellum of which appears to be inside the orbit. The antennules fold very obliquely. There is a broad vertical space between the lower edge of the orbit and the edge of the buccal cavern.

The buccal cavern is triangular: the merus of the external maxillipeds is half the length of the ischium measured along the inner border.

The chelipeds are about  $1\frac{1}{2}$  the length of the carapace: the hand is short and globular: the fingers are slender and hook-like, much longer than the hand, and open in a somewhat oblique plane, the tip of the mobile finger moving easily through an arc of  $120^\circ$ . Legs rather large.

Abdomen of male with the 3rd and 4th segments fused: that of the female with all the segments distinct.

81. *Iphiculus spongiosus*, Adams and White.

*Iphiculus spongiosus*, Adams and White, 'Samarang' Crustacea, p. 57, pl. xiii. fig. 5: Stimpson, Proc. Acad. Nat. Sci. Philad. 1858, p. 161: Miers, Zool. H. M. S. 'Alert' pp. 185, 253.

Carapace convex, transversely ovoidal, much broader than long, the surface when denuded of its woolly covering granulous with numerous larger pustulous tubercles, and showing the cardiac and intestinal regions tumid and very well demarcated by grooves. On the antero-lateral margins are four large coarse close spines, increasing in size from before backwards; on the postero-lateral margins are two coarse dentiform tubercles separated by a wide interval.

The broad front is coarsely bilobed : there is a strong tooth at the outer angle of the orbit against which the retracted eye impinges, and another at the outer angle of the buccal cavern, on either side—only visible on the denuded carapace.

Except that they are densely tomentose up to the base of the fingers, and that the fingers are even more slender, the chelipeds are a repetition of those of *Myrodes*.

In the Indian Museum are numerous specimens, from the Andamans, the Mekrán Coast, and from the Bay of Bengal up to 65 fms.

*Pariphiculus*, n. gen.

Closely allied to *Iphiculus*, but differing in several important characters and in the whole form of the carapace. The appendages are as densely tomentose as in *Iphiculus*, but the carapace is covered with a finer and sparser tomentum which does not quite conceal the texture of the surface.

The carapace is circular and globular, with its margins coarsely spinate, and its surface vesiculous : the intestinal region is very distinctly isolated, but the other regions are almost lost in the general convexity of the carapace.

The front is narrow : in one species it projects as a distinct snout, in the other the angle of the afferent branchial canal can be seen beyond it in a dorsal view, but the whole mouth can never be seen beyond it as it can in *Iphiculus*.

The orbits are obliquely elongate and completely conceal the eyes : two distinct fissures are plainly visible in the emarginate roof besides a fissure in the lower part, and there is a gap at the inner canthus where the basal joint of the antenna—the flagellum of which is large—stands. The antennules fold very obliquely. There is a space of varying width between the edge of the orbit and the edge of the buccal cavern.

The buccal cavern is rather elongate triangular, and the merus of the external maxillipeds is half the length of the ischium measured along the inner border.

The chelipeds are from  $1\frac{1}{4}$  to  $1\frac{3}{8}$  times the length of the carapace : the hand is short, cylindrical with the base inflated, or is subglobular, but not nearly so swollen as in *Iphiculus* or *Myrodes* : the fingers are slender, much longer than the hand and somewhat hooked ; they open in an obliquely vertical plane, and the tip of the mobile finger moves through the usual arc of about  $75^{\circ}$ . The legs are moderately stout. The abdomen of the male has the 3rd, 4th and 5th segments fused : that of the female has all the segments distinct.

*Key to the Indian species of Pariphiculus.*

- I. Carapace a little broader than long: front not at all prominent: a spiniform tubercle on the cardiac region between one on either branchial region: chelipeds about  $1\frac{2}{3}$  the length of the carapace ..... *P. coronatus*.
- II. Carapace longer than broad: front markedly prominent: cardiac region and branchial regions immediately on either side of it unarmed: chelipeds about  $1\frac{1}{4}$  the length of the carapace ..... *P. rostratus*.

82. *Pariphiculus coronatus*, Alcock & Anderson.

*Randallia coronata*, Alcock & Anderson, J. A. S. B., Vol. LXIII. pt. 2, 1894, p. 177.

*Pariphiculus coronatus*, Alcock & Anderson, Ill. Zool. 'Investigator,' Crust. pl. xxiv. fig. 2 (in the press).

Carapace globular, just broader than long, its surface closely covered with large vesiculous granules beneath a dense fine-textured pubescence: the intestinal region forms an independent circular swelling, bounded by a deepish groove, and surmounted by two spiniform tubercles, one behind the other: the gastric region is partly defined anteriorly by two creases, and the cardiac region is partly defined posteriorly by two grooves, and a narrow and indistinct groove separates the hepatic from the branchial region on either side: on either lateral margin are 5 spiniform tubercles, not including the dentiform prolongation of the outer angle of the buccal cavern, and at either end of the short posterior margin is a dentiform tubercle: 3 similar tubercles occur, one in the middle of the cardiac region and one on either side of it on the after part of the branchial regions—these three, along with the last on the lateral borders and the two on the posterior margin, forming a ring round the tumid intestinal region: the side-wall of the carapace is grooved longitudinally just above the epimeral edge.

The front is bidentate, its tips just projecting beyond the level of the buccal cavern.

The chelipeds in the female (male unknown) are  $1\frac{2}{3}$  times the length of the carapace: the hand is inflated, cylindrical, and about  $\frac{2}{3}$  the length of the fingers: the fingers are very slender, almost hairless, hooked at tip, finely denticulate with a few slightly larger denticles at distant intervals, and they open in an obliquely vertical plane.

Length of carapace of female (apparently adult) 16 millim., breadth 17 millim.

*Loc.* Bay of Bengal, off Coromandel coast, 112 fms.

83. *Pariphiculus rostratus*, n. sp. Plate VIII. fig. 2.

Carapace globular, a little longer than broad, with the front prominent and projecting in the form of a snout; its surface covered with very small, distant vesicles, beneath a dense fine pubescence: the intestinal region exactly resembles that of *P. coronatus*, and the gastric and cardiac regions are incompletely defined in the same way: on either lateral border are six sharpish tubercles, the first of which—situated about the middle of the pterygostomial ridge—and the third—situated near the anterior limit of the branchial region—are enlarged and spiniform: at either end of the short posterior margin is a dentiform tubercle: the side-wall of the carapace is traversed longitudinally by two grooves, one just above the epimeral edge, the other just below the lateral margin, and the surface between the grooves is tumid.

The very prominent front is sharply bidentate, the tips of the teeth being somewhat sharpened and thickened: the space between the edge of the orbit and the edge of the buccal cavern is much reduced.

The chelipeds are similar in both sexes and are about  $1\frac{1}{4}$  times the length of the carapace, sometimes less than this: the hand is subglobular but not so swollen as in *Iphiculus* and is only about half the length of the fingers: the fingers are slender, hooked at tip, and finely denticulate, the denticulations, however, being obscured by a thick growth of short colourless hairs; they open in an obliquely vertical plane.

The largest specimen—an apparently adult female—has the carapace 32 millim. long and 27 millim. broad.

*Loc.* Off Malabar coast 28 to 45 fms., off Coromandel coast 25 to 30 fms., on soft muddy bottoms.

*Nursilia*, Bell.

*Nursilia*, Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 308, and Cat. Leucos. Brit. Mus. p. 20.

Carapace broader than long, bluntly polygonal, with the lateral borders sharp, thin, laminar, somewhat turned up, and with the surface broken by some definitely-placed ridges and distant spines. Front prominent, bidentate: orbits with two distinct sutures, their lower edge not distinct from the edge of the buccal cavern. Antennæ with longish flagella, their basal joint occupying the very much restricted space between the eye and the obliquely folding antennules.

Buccal cavern elongate-oval, the hairy tips of the external maxillipeds projecting beyond the edge of the buccal cavern: the merus much hidden in hair (more so than in *Lea*) and considerably less than half the length of the ischium.

Chelipeds somewhat slender, about half again as long as the carapace: hands swollen, especially towards the inner side and the base: fingers much longer than the hand, slender, hook-like; the tip of the dactylus moves through an arc of more than  $130^{\circ}$ .

In the abdomen of both sexes all but the first and last segments are intimately fused.

As the name indicates, this form has the carapace and front shaped very much as in *Nursia*, though approaching *Ilia*—or rather *Myrodes*—in the form of the chelipeds and mouth-parts.

#### 84. *Nursilia dentata*, Bell.

*Nursilia dentata*, Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 309, pl. xxxiv. fig. 6, and Cat. Leucos. Brit. Mus. p. 20: Stimpson, Proc. Acad. Nat. Sci. Philad. 1858, p. 161: Haswell, P. L. S., N. S. Wales, IV. 1879, pp. 56, 404, and Cat. Austral. Crust. p. 128: Miers, Zool. H. M. S. 'Alert,' pp. 158, 253, 518, 548: R. I. Pocock, Ann. Mag. Nat. Hist. (6) V. 1890, p. 73.

Carapace broader than long, distinctly polygonal in the male, but with the angles more rounded off in the female. The lateral margins are thin, sharp, slightly turned up, and sinuous (laciniate in the young): the ends of the short posterior margin are dentiform in the male, but indistinctly so in the female.

The carapace is traversed by a longitudinal carina, on the posterior half of which are 3 large vertical spines with the tips often curved forwards: an oblique ridge ending in a sharpish tooth separates the gastric from the hepatic region on either side: another oblique ridge, with a sharpish tooth at each end, runs across the after part of the branchial region to the postero-lateral margin on either side: there are always one or two teeth on either side of the longitudinal carina in the gastro-cardiac region. In the young the oblique gastro-hepatic ridge is connected by a longitudinal ridge with the oblique branchial ridge, the branchial ridges more or less meet across the carapace, and the spines are more numerous and more distinct.

The chelipeds have the arm very sharply trigonal: the fingers are slender and hook-like and are twice the length of the much swollen hand: they are finely denticulate with enlarged teeth at distant intervals, and as in *Myrodes*, the dactylus is remarkable for the great range of its mobility.

Adult females have the carapace about 9 millim. long and about 10.5 millim. broad: adult males are a good deal smaller.

A large number of specimens are in the Indian Museum Collection, from the Andamans, from off Ceylon at 32 to 34 fms., from the Madras coast in the neighbourhood of Palk Straits, from off the Malabar coast at 26 to 31 fms., and from off the Maldives at 20 to 30 fms.

85. *Nursilia tonsor*, n. sp.

This species is distinguished (1) by its smaller size,—ovigerous females having the carapace only 7 millim. long and 7.25 millim. broad, and adult males being a good deal smaller: (2) the gastro-cardiac region is defined posteriorly on either side by an oblique dentigerous ridge, which meets the oblique ridge that traverses either branchial region at an obtuse angle—the whole forming a sharply defined W reversed: (3) the hand is less swollen and the outer edge of the fingers is cristiform—the cristiform lamina being of extreme thinness and delicacy: (4) the serrations of the lateral margins and the ridges and spines of the carapace are all much sharper-cut.

*Loc.* Andaman Sea up to 40 fms., off Ceylon 34 fms.

*Heterolithadia*, Wood-Mason, (name only).

Carapace broader than long, transversely somewhat oval, its surface nodular, coarsely granular, convex except the hepatic regions which are hollowed; all the regions well delimited by grooves.

Front distinct, moderately prominent, broadly bidentate. Orbits with very indistinct sutures in the outer wall, and with very little space between their lower edge and the edge of the buccal cavern. The antennules fold obliquely. The antennæ have a short flagellum and occupy the much restricted space between the antennules and the eye.

Buccal cavern triangular with the sides curved somewhat as in *Nursilia*: merus of external maxillipeds half the length of the ischium measured along the inner border.

Chelipeds stout, about half again as long as the carapace: hand very short, swollen, half the length of the fingers: fingers slender, of nearly the same diameter from base to near the hook-like tip, opening in a nearly vertical plane, the tip of the dactylus being movable through an arc of about 75°.

The abdomen of the male has the 3rd–6th segments fused.

*Heterolithadia* has a strong external resemblance to *Lithadia*, but has the *Ilia* fingers and external maxillipeds. Its nearest ally is *Nursilia*.

86. *Heterolithadia fallax*, (Henderson).

*Ebalia fallax*, J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 402, pl. xxxviii. figs. 4–6.

The posterior half of the carapace is a segment of a broad ellipse, the anterior half is broadly triangular.

The carapace is broader than long, and its surface, like the whole under surface of the body and the whole surface of the arms, is closely covered with large flat-topped pearly granules, except in the deeply-excavated hepatic areas where the granules are small and rather distant.

The regions are well demarcated by grooves, and (except the hepatic regions, which are markedly excavated inside of the rather prominent antero-lateral borders) are tumid. A broadish median ridge extends from the front to near the middle of the cardiac region, where it ends in a stout tubercle, and in continuation of the same line, on the intestinal region, are two similar tubercles: there are also four similar tubercles on the gastric region,—two on either side of the median ridge.

The front is broadly bidentate: behind it the pterygostomian ridge, which ends at a coarse denticle, can be seen in front of the antero-lateral margin in a dorsal view: the hepatic portion of the antero-lateral margin is thickened and ends abruptly at a very prominent granular swelling; behind this the lateral margin is most elegantly curved. The posterior margin is rather prominent and is bilobed, the apex of one of the intestinal tubercles being seen between the lobes in a dorsal view.

The chelipeds are rather more than half again as long as the carapace: the arm is coarsely granular like the carapace, the wrist and hand are granular under the lens: the hand has the outer edge somewhat thickened and raised and the inner side swollen: the fingers are hooked, are twice the length of the hand, and open in a nearly vertical plane; their opposed edges are finely denticulate with larger denticles at distant intervals and with a good many hairs.

The abdomen of the male has a tooth at the penultimate segment.

In the Indian Museum is a specimen from the Audamans and one from the Orissa Coast.

#### *Arcania*, Leach.

*Arcania* and *Iphis*, Leach, Zool. Miscell. III. p. 19.

*Arcania* and *Iphis*, Milne Edwards, Hist. Nat. Crust. II. 133, 138.

*Arcania* and *Iphis*, Bell, Trans. Linn. Soc., Vol. XXI. 1859, pp. 309, 311, 312.

*Arcania*, A. Milne Edwards, Nouv. Archiv. du Mus. X. 1874, p. 48.

*Arcania*, Miers, 'Challenger' Brachyura, p. 299.

Carapace globular, ovoid, or rhomboidal, with the lateral and posterior margins armed with definitely-situated large spines (except in *Arcania gracilipes* Bell, in which large tubercles take the place of spines, and *A. orientalis* Miers, in which spines are absent), and with

the surface, usually, crisply granular, spiny, or tubercular, but sometimes almost smooth to the naked eye.

Front bilobed and prominent, or if not prominent then distinctly pinched off from the gastric and hepatic regions.

Orbits with three sutures in the upper and outer wall, with a cleft in the inner wall, and usually with the inner canthus prolonged into a spine: eyes small.

The antennules fold very obliquely. The antennæ are small, and their basal joint loosely fills the cleft in the inner wall of the orbit.

The buccal cavern is elongate-triangular: the external maxillipeds have the ischium from  $2\frac{1}{2}$  to 3 times the length of the bluntly-triangular merus: their exognath is narrow, with the outer border nearly straight.

The chelipeds are very slender and are usually about twice the length of the carapace—either a little more or a little less; their joints are cylindrical, the palm alone being a little swollen at base: the fingers are long and very slender, their opposed edges being finely ctenoid, with larger denticles at long intervals; they open in a nearly vertical plane.

The legs are slender.

The abdomen of the male usually consists of 5 pieces, that of the female of 4 or 5.

*Key to the Indian species of Arcania.*

- I. Margins of the carapace with spines, hepatic regions dorsally convex: abdomen of adult male consisting of 5 pieces:—

1. Fingers longer than the hand: surface of carapace either smooth (microscopically granular), or with small granules all of one size:—

- i. Lateral median epibranchial spines nearly straight, far longer than any of the other spines, their length often being equal to the breadth of the carapace:—

- a. Seven spines on margins of carapace,—3 very large, 4 smaller..... *A. septemspinosa*,  
(Fabr.)

- b. Five spines on margins of carapace,—3 very large, 2 smaller ..... *A. quinquespino*s*a*.



- ii. Median lateral epibranchial spines claw-like, not longer than the spines on the posterior part of the carapace, their length being not a quarter the breadth of the carapace:—
      - a. Nine spines on margins of carapace,—3 large and 6 smaller: regions of carapace very ill-defined *A. novemspinosa.*
      - b. Eleven spines on margins of carapace,—none of them very large: regions of carapace well defined ..... *A. undecimspinosa.*
  - 2. Fingers shorter than the hand: surface of carapace covered with spines, or with granules and larger tubercles:—
    - i. Carapace longer than broad: chelipeds less than twice the length of the carapace:—
      - a. Carapace densely spiny: eleven large marginal spines ..... *A. erinaceus.*
      - b. Carapace with granules and claviform tubercles: eleven marginal prominences, of which only 4 or 5 can be called spines *A. tuberculata.*
    - ii. Carapace broader than long: chelipeds a little over twice the length of the carapace: carapace with granules and large tubercles ..... *A. pulcherrima.*  
 (= *A. septemspinosa*, Bell.)
- II. Margins of carapace with large tubercles in place of spines, hepatic regions dorsally sunken and flat: abdomen of adult male consisting of 4 pieces, and the second piece sunk almost out of sight ..... *A. gracilipes.*

87. *Arcania septemspinosa*, (Fabr.), Leach, Edw.

*Cancer septemspinus*, Fabr., Mant. Ins. I. 325, and Ent. Syst., II. 463: Hertat, Krabben, I. ii. 259, pl. xx. fig. 112.

*Leucosia septemspinosa*, Fabr., Ent. Syst. Suppl., p. 351: Bosc, Hist. Nat. Crust. I. 237: Latreille, Hist. Nat. Crust. et Ins. VI. 119.

*Iphis septemspinosa*, Leach, Zool. Miscell. III. p. 25: Desmarest, Consid. Gen. Crust., p. 170: Milne Edwards in Cuvier Règne Animal, Crust., pl. xxv. fig. 4, and Hist. Nat. Crust. II. 139: Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 311, and Cat. Leucos. Brit. Mus. p. 22: Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 161: Miers, Ann. Mag. Nat. Hist. (5) V. 1880, p. 317: Sluiter, Tijdschr. Nederl. Ind. XL. 1881, p. 159, fig. 1.

*Arcania septemspinosa*, Miers, 'Challenger' Brachyura, p. 300: Henderson, Trans. Linn. Soc. Zool. (2) V. 1893, p. 403.

Carapace bluntly rhomboidal, the anterior blunt angle of the rhomb forming the elegantly bilobular, slightly projecting, front, and the lateral and posterior angles being all produced to form huge slightly-curved spines—the lateral ones being the longest. Besides these, there are four other smaller spines in the posterior part of the carapace, namely one on either side at the level of, and one on either side below, the large posterior spine. The surface of the carapace is finely granular in irregular patches, the granules being most distinct on the large spines. The hepatic regions are separated from the branchial regions on either side by a transverse crease or pucker, but otherwise the regions of the carapace are not clearly demarcated. The summit of the (antero-lateral) convexity of the hepatic region is, usually, faintly acuminate. The chelipeds are symmetrical and slender, and are more than twice the length of the carapace (posterior spine excluded) in both sexes: the long cylindrical arms are very finely and uniformly granular: the almost filiform fingers are a little longer than the slender tapering hand. The true legs are slender and smooth, and the dactyli are thickly fringed with rather long hair: the first pair exceed the arm in length by their dactylus and rather more than half their propodite.

Colours streaky and patchy red.

The carapace of an average adult of either sex is about 20 millim. long, and about 20 millim. broad.

*Localities*: Andamans, Arakan, Gangetic and Máhánaddi Deltas, Madras coast, Persian Gulf. It is commonest on muddy bottoms at about 25 fathoms.

Of 92 specimens in the Indian Museum the lateral spines are found to vary a good deal in length: they are usually, in adults, about as long as the arm, and sometimes a good deal longer; but in the young they are usually much shorter than the arm.

88. *Arcania quinquespinosa*, Wood-Mason MS. name,  
Alcock and Anderson.

*Arcania quinquespinosa*, Alcock and Anderson, J. A. S. B., Vol. LXIII. pt. 2, 1894, p. 206, and Ill. Zool. B. I. M. S. "Investigator," Crust., pl. xxiv. fig. 6 (*in the press*).

? *Arcania septemspinosus*, var. *gracilis*, Henderson, Trans. Linn. Soc. Zool. (2) V. 1893, pp. 403, 404.

Differs from *A. septemspinosus* (Fabr.) only in the following particulars:—

1. It is a much smaller species, the carapace of the adult being less than 12 millim. long, and less than 14 millim. broad.

2. The outline of the carapace is broadly conical, owing to the bulging, obliquely backwards, of the branchial regions.

3. The front is sharply bidentate, instead of bilobular.

4. The large spines of the margins of the carapace are relatively smaller, and the spine on the postero-lateral border, on either side, is either altogether wanting or is represented only by a granule.

5. The regions of the carapace, with the single exception of the boundary between the gastric and cardiac regions, are distinctly delimited by fine grooves.

6. The fingers are nearly twice the length of the hand.

7. The cardiac region in life, and even in fresh spirit specimens, shows as a large bright red milk-white-edged ocellus. The rest of the carapace is delicate pink in life.

In the Indian Museum collection are 27 specimens—chiefly adult males and egg-laden females—from the coasts of Arakan, Ganjam, Vizagapatam, Ceylon, and the Persian Gulf.

89. *Arcania undecimspinosus*, De Haan.

*Arcania undecimspinosus*, De Haan, Faun. Japon. Crust., p. 135, pl. xxxiii. fig. 8: Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 309, and Cat. Leucos. Brit. Mus. p. 21: Miers, Zool. H. M. S. 'Alert' pp. 518, 548: (?) A. O. Walker, Journ. Linn. Soc., Zool., Vol. XX. 1890, p. 111: Ortmann, Zool. Jahrbüch., Syst. etc., VI. 1892, p. 577: J. R. Henderson, Trans. Linn. Soc., Zool. (2) V. 1893, p. 404.

*Arcania granulosa*, Miers, Trans. Linn. Soc., Zool., (2) I. 1875-79, p. 240, pl. xxxviii. fig. 29 (*vide* Miers, P. Z. S. 1879, p. 44): Haswell, P. L. S., N. S. Wales, IV. 1879, p. 58, and Cat. Austral. Crust. p. 131.

?? *Arcania novemspinosus* var. *aspera*, Miers, Ann. Mag. Nat. Hist (5) V. 1880, p. 317.

Carapace longitudinally ovoid in the male, nearly globular in the adult female, uniformly covered either with rather distant miliary granules or with close-set short prickles, amid which the fine smooth grooves that define the regions of the carapace are very distinct,—the

only one wanting being that between the gastric and cardiac regions. The margins of the carapace are armed with eleven spines of moderate size, situated as follows:—one, pointing obliquely forwards, in either antero-lateral border, at the culmination of the sub-hepatic region; one on either side just behind the groove that separates the hepatic from the branchial region; one, claw-like, at either (median) lateral epibranchial angle; one, pointing obliquely backwards, just abaft the middle of either postero-lateral border; one at either end of the posterior border; and one, pointing straight backwards, in the middle of the intestinal region. The front ends in two sharp-cut laminar teeth.

The slender chelipeds, in the adult male, are just over twice the length of the carapace (spine excluded); the arm is usually, but not always, covered in all or the greater part of its extent with miliary granules similar to those on the carapace; the almost filiform fingers are as long as the hand and rather more than half the wrist combined. The true legs are slender and smooth; their dactyli are scantily fringed with hair in their distal half: the first pair exceed the arm in length by their last two joints.

The length of the carapace of the adult male is about 16 millim., and the breadth about 14 millim.; of an adult female the dimensions are 18 millim. by 16 millim.

In the Indian Museum collection are young and adults of both sexes, from the Andamans and from the Madras side of Palk Straits.

#### 90. *Arcania novemspinosa*, Adams & White.

*Iphs novemspinosa*, Adams & White, 'Samarang' Crust. p. 56, pl. xiii. fig. 1.

*Arcania novemspinosa*, Bell, Trans. Linn. Soc., Vol. XXI. 1855, p. 309, and Cat. Leucos. Brit. Mus. p. 21: Haswell, P. L. S., N. S. Wales, IV. 1879, p. 58, and Cat. Austral. Crust. p. 131: de Man, Archiv für Naturges. LIII. 1887, i. 392.

Differs from *A. undecimspinosa*, De Haan, only in the following characters:—

1. The surface of the carapace, in the adult, is almost smooth—at any rate is without isolated miliary granules or prickles.

2. The marginal spines are very much larger, with the single exception of the spine on either side situated at the junction of the sub-hepatic and branchial regions, which is a mere denticle or granule.

3. With the exception of a faint groove between the hepatic and branchial regions, and of a still more indistinct break of level between the branchial and intestinal regions on either side, the regions of the carapace are not defined.

4. The front is more prominent.

5. The chelipeds in the adult male are  $2\frac{1}{2}$  times the length of the carapace, and the arm is only very finely granular, and at the base only.

6. The carapace in the adult male is a little more elongate.

Two adult males and a half-grown female from the Andamans are in the Indian Museum collection.

The differences above noted are plain enough in extreme forms, but their *sum* is not constant, as it is in the case of the differences between *A. 7-spinosa* and *A. 5-spinosa*, so that it seems doubtful whether *A. 9-spinosa* is really distinct from *A. 11-spinosa*.

### 91. *Arcania erinaceus*, (Fabr.)

*Cancer erinaceus*, Fabricius, Mantiss. Insect. I. 325, and Ent. Syst. II. 460: Herbst, Krabben, I. ii. 258, pl. xx. fig. 111.

*Leucosia erinaceus*, Fabr., Ent. Syst. Suppl. p. 352: Latr., Hist. Nat. Crust. et Ins. VI. 119.

*Arcania erinaceus*, Leach. Zool. Miscell. III. p. 24: Desmarest, Consid. Gen. Crust., p. 170, pl. xxviii. fig. 1: Milne Edwards in Cuvier Règne An., Crust., pl. xxiv. fig. 2, and Hist. Nat. Crust. II. 134: Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 309, and Cat. Leucos. Brit. Mus. p. 20.

Carapace globular, everywhere thickly covered with thorns and spine-like granules, amid which the smooth shallow sulci that define the branchial and hepatic regions are visible. Round the margin of the carapace are eleven large spines, similar in position to but larger in size than those of *A. undecimspinosa*, and covered with secondary spinelets. The ventral surface of the external maxillipeds, the thoracic sterna, and the abdominal terga are all also sharply granular. The front ends in two prominent sharp teeth.

The chelipeds and the true legs have their meropodites covered with thorns, and the other joints—except the dactyli, the distal half of the hand, and the fingers—sharply granular. The chelipeds, even in the adult male, are only about  $1\frac{2}{3}$  times the length of the carapace (spine excluded), and the fingers are a little shorter than the palm. The first pair of true legs exceed the arms in length by their last  $2\frac{1}{2}$  joints.

The carapace of the adult male is 16 millim. long and 14 millim. broad; that of the adult female is 21 millim. long and 19 millim. broad.

*Loc.* East coast, from the Hooghly to Pondicherry. In the Indian Museum collection are an adult male and a young and three adult females.

### 92. *Arcania tuberculata*, Bell.

*Arcania tuberculata*, Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 310, pl. xxxiv. fig. 8, and Cat. Leucos. Brit. Mus. p. 21.

? *Arcania lævimana*, Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 310, pl. xxxiv.

fig. 10, and Cat. Leucos. Brit. Mus. p. 22: A. Milne Edwards, Nouv. Archiv. X. 1874, p. 48, pl. iii. fig. 4.

Carapace subglobular with an abruptly prominent bidentate front; closely covered everywhere, except in the anterior half of the front, with elongate granules some of which are large and claviform. The regions of the carapace are fairly well defined. In the position of the marginal spines of *A. undecimspinosus* there are 11 marginal prominences, of which only 4 or 5 in the posterior part of the carapace deserve the name of spines, the others being denticles not vastly larger than the enlarged claviform tubercles of the dorsal surface. These spines and denticles are covered with secondary granules in all or part of their extent.

The chelipeds, even in the adult male, are not  $1\frac{1}{2}$  times the length of the carapace: the arms are elegantly granular; the wrists have a few granules and, on their outer surface, a tooth; the hands are nearly smooth: the fingers are little shorter than the hand.

The legs are slender and perfectly smooth.

The carapace of the adult male is 8 millim. long and 6 millim. broad, that of the adult female is 10 millim. long and 9 millim. broad.

*Loc.* Andamans and Maldives. In the Indian Museum collection are 11 specimens—young and adults of both sexes, including ovigerous females.

### 93. *Arcania pulcherrima*, Haswell.

*Arcania septemspinosus*, Bell nec Fabricius, Bell, Trans. Linn. Soc., Vol. XXI. 1855, p. 310, pl. xxxiv. fig. 7, and Cat. Leucos. Brit. Mus. p. 21.

*Arcania pulcherrima*, Haswell, P. L. S., N. S. Wales, IV. 1879, p. 58, and Cat. Austral. Crust. p. 131: Miers, Zool. H. M. S. 'Alert' p. 253 (*ubi synonym.*), and 'Challenger' Brachyura, p. 299 (footnote).

Carapace transversely ovoid, the front not breaking beyond the general outline: its surface everywhere covered with miliary granules, amid which stand out 13 or 14 granule-covered tubercles arranged in five incomplete longitudinal rows. Round the margin of the carapace are 10 granule-covered prominences, the first two of which on either side are mere denticles, while the remaining six are broad spines,—those at the lateral epibranchial angle on either side being much the longest. The regions of the carapace are ill defined. The inner canthus of the orbit is not prolonged into a spine as it is in all the preceding species.

The chelipeds are slender even for the genus, and in the adult male are just over twice the length of the carapace: the arm alone is elegantly granular: the fingers are a little shorter than the hand. The true legs are slender and perfectly smooth.

The carapace of the adult male is about 9 millim. long and 10 broad; that of the adult female is about 10 millim. long and 12 broad.

In the Indian Museum collection are 3 adult males and 2 adult females (one egg-laden) from off Ceylon, 34 fms.

#### 94. *Arcania gracilipes*, Bell.

*Arcania gracilipes*, Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 310, and Cat. Leucos. Brit. Mus. p. 22: (Haswell. P. L. S., N. S. Wales, Vol. IV. 1879, p. 58?)

Carapace globular, just as broad as long, with the hepatic regions dorsally sunken and flat, so as to throw the front—which does not otherwise project much—into strong relief. The circumference, like the dorsum of the carapace, is armed not with spines, but with numerous large tubercles, which, like the general surface between them, are closely covered with flat discoidal granules: there are altogether about 24 of these large tubercles. The regions of the carapace are fairly well defined. The front ends in two blunt teeth: the inner canthus of the orbit is not prolonged into a spine.

The chelipeds, in the adult male, are slightly over twice the length of the carapace: the arm wrist and hand are elegantly granular like the carapace, the granulation in the case of the wrist and hand being microscopic: the fingers are just equal in length to the hand. The true legs are slender, and are microscopically granular like the hand: the first pair exceed the arm by less than the length of their dactylus.

The abdomen of the male consists of only four pieces, but the second piece is hidden almost out of sight. The carapace of the adult male is 7 millim. long and broad, that of the female 10 millim.

An adult male and 5 females—three ovigerous—from the Andamans.

#### *Ixa*, Leach.

*Ixa*, Leach, Trans. Linn. Soc. Vol. XI. 1815, p. 334.

*Ixa*, Milne Edwards, Hist. Nat. Crust. II. 134.

*Ixa* Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 311, and Cat. Leucos. Brit. Mus. p. 23.

*Ixa*, Miers, 'Challenger' Brachyura, p. 1300.

Carapace broadly rhomboidal, produced on either side, at the junction of the antero-lateral and postero-lateral borders, into a great sausage-shaped spine of enormous size often with an abruptly acuminate point. The median regions of the carapace are separated on either side from the branchial, either by a broad trench which bifurcates anteriorly to isolate the hepatic regions from the branchial regions and from the front, or by a shallow groove which has similar relations. The

front is broadish and broadly bilobed, and does not project as far as the salient edges of the afferent branchial canal.

The orbits are deep and completely conceal the eyes, their outer wall is marked by 3 closed sutures, the surfaces between which are very convex; there is a widish gap at the inner canthus where the antennæ with their small flagellum are found. The antennules fold obliquely.

The external maxillipeds are sunk altogether or in part a good deal below the level of the sharp edges of the buccal cavern: they are longitudinally hollowed or grooved along their inner border, the merus more deeply than the ischium: the last-named joint is about twice the length of the narrowly-triangular merus.

The chelipeds are hardly stouter than the slender legs: and are markedly less than twice the length of the carapace: the distal half of the hand is almost filiform: the fingers are hardly half the length of the hand, are filiform, and open in a vertical plane.

The abdomen of the male has the 3rd 4th and 5th segments coalescent, that of the female has the 3rd-6th coalescent.

*Key to the Indian species of Ixa.*

- I. Channels of carapace with very definite undermined edges: lateral processes with very abruptly acuminate tip: buccal frame distinctly triangular: exognaths with the surface concave and almost devoid of granules..... *I. cylindrus.*
- II. Channels of carapace simply grooves of no very remarkable appearance: lateral processes gradually tapering: buccal frame quadrangular: exognaths with the surface, in the basal three-fourths, tumid and covered with a mosaic of large granules ..... *I. inermis.*

95. *Ixa cylindrus*, (Fabr). Leach.

*Cancer cylindrus*, Fabricius, Mantiss. Ins. I. 323, and Ent. Syst. II. 456.

*Cancer cylindricus*, Herbst, Krabben, I. ii. 109, pl. ii. figs. 29-31.

*Leucosia cylindrus*, Fabricius, Ent. Syst. Suppl. p. 352: Bosc, Hist. Nat. Crust. I. 237: Latreille, Hist. Nat. Crust. et. Ins. VI. 119.

*Ixa cylindrus*, Leach, Trans. Linn. Soc. Vol. XI. 1815, p. 334: Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 311 (part): Miers, 'Challenger' Brachyura, p. 301 and footnote.

*Ixa canaliculata*, Leach, Zool. Miscell. III. p. 26, pl. 129, fig. 1: Desmarest, Consid. Crust. p. 171, pl. xxviii. fig. 3: Milne Edwards, Cuvier, Règne An., Crust. pl. xxiv. fig. 1, and Hist. Nat. Crust. II. 135: A. Milne Edwards, in Maillard's P<sup>le</sup> Réunion, Annexe F, p. 10.



*Ixa megaspis*, Adams and White, 'Samarang' Crust. p. 55, pl. xii, fig. 1 : Miers, 'Challenger' Brachyura p. 301 (var. of *cylindrus*).

Carapace covered with vesiculous granules between which it is smooth and polished, and there are some largish smooth patches on the branchial regions: the channels of the carapace are deep and very well defined, with undermining edges, and have the floor more or less coated with pubescence: the huge cylindrical lateral processes are of almost the same diameter at their distal end as at their base, and their rounded end is abruptly surmounted by a spine: the distance between the edge of the raised plane of the gastric region and the free edge of the front is nearly equal to the anterior breadth of the front: the ends of the posterior margin are a little thickened and prominent, but are hardly dentiform even in the young.

The buccal cavern, though truncated, has a distinctly triangular shape: the exognath, when denuded of its distal pubescence, is found to have a smooth and longitudinally concave surface, the concavity falling along the inner border; and is seen to fall short of the raised anterior edge of the afferent branchial channel by a mean distance equal to nearly half the length of the merus: the raised outer border of the ischium has a narrow band of vesiculous granules, wanting at the basal end.

Four males and four females (three adult) are in the Indian Museum collection from the Andamans, and from the Madras coast in the neighbourhood of Palk Straits.

The largest female has the carapace 20 millim. long by 60 millim. in extreme breadth.

#### 96. ? *Ixa inermis*, Leach.

*Ixa inermis*, Leach, Zool. Miscell. III. p. 26, pl. 129, fig. 2: Desmarest Consid. Crust. p. 171: Milne Edwards, Hist. Nat. Crust. II. 135: Huaswell, P. L. S., N. S. Wales, IV. 1879, p. 59, and Cat. Austral. Crust. p. 132.

Carapace covered with vesiculous granules between which it is distinctly rough: the channels of the carapace are merely grooves, and are devoid of pubescence: the lateral processes are curved forwards, and taper gradually to a point: the distance between the gastric region (no part of which region has the form of a definitely raised plane) and the free edge of the sharply bidentate front is much less than the anterior breadth of the front: there is a large granular petaloid tubercle at either end of the posterior margin.

The buccal cavern is distinctly quadrangular, owing to the eversion of the outer lip of the afferent branchial channel: the exognath in its basal three-fourths is very strongly convex, the surface of the convexity

being covered with large polished pearly granules polygonal by mutual appression; its hairy distal end is suddenly depressed and does not fall much short of the front edge of the afferent branchial canal: the ischium is grooved along its inner border, but the rest of its surface is tumid and granular just like the exognath.

In the Indian Museum collection is a single female with the carapace 17 millim. long by 42 millim. in extreme breadth, from 23 fathoms off the Orissa Coast.

I believe that this species must be Leach's *Ixa inermis*, as it corresponds with Leach's figure. Unfortunately the mouth-parts are not figured or described. They are most characteristic in this species, which cannot be mistaken for *I. cylindrus*.

### Family DORIPPIDÆ.

*Dorippiens*, Milne Edwards, Hist. Nat. Crust. II. 151 (*partim*).

*Dorippidea*, De Haan, Faun. Japon. Crust. p. 120.

*Dorippidæ*, Dana, U. S. Expl. Exp. Crust. pt. I. p. 390.

*Dorippidæ*, Miers, Challenger Brachyura, p. 326.

Carapace flat, generally broadest behind near the plane of the posterior border, hiding not much more than half of the abdominal terga, the first three of which are commonly visible in a dorsal view quite uncovered. The orbits are somewhat incomplete. The antennules are commonly too large to fold inside their fossettes. The antennæ are large. The mouth-parts somewhat resemble those of the *Calappidæ*: the buccal cavern is prolonged forwards to form an efferent branchial canal which is covered in below by a long lamellar process of the first maxillipeds. The first two pairs of true legs are remarkably long and stout: the last two pairs on the contrary are remarkably short and slender, and occupy a singular position in the dorsal plane of the body. The position of the afferent branchial canal varies. The vasa deferentia perforate the 5th thoracic sternum on either side. The branchiæ are less than nine in number on either side.

The Dorippidæ may be divided into two sections or subfamilies as follows:—

1. *Dorippinæ*, in which the external maxillipeds leave a considerable part of the buccal cavern uncovered, and in which the afferent branchial openings are situated either immediately or shortly in advance of the bases of the chelipeds.

2. *Tymolinæ*, in which the external maxillipeds almost completely cover the buccal cavern, and in which the afferent branchial openings may or may not be situated near the bases of the chelipeds.

The following is a list of known genera, Indian genera being printed in Roman type and genera known to me by autopsy being marked with an asterisk.

### Family **Dorippidæ**.

#### Sub-family I. *Dorippinae*.

\**Dorippe*.

\**Ethusa* (\**Ethasina*).

† *Cymopolus*, A. Milne Edwards, Bull. Mus. Comp. Zool. VIII. 1880, p. 27.

#### Sub-family II. *Tymolinae*.

*Tymolus*, Stimpson, Proc. Acad. Nat. Sci. Philad., 1858, p. 163.

*Cyclodorippe*, A. Milne Edwards, Bull. Mus. Comp. Zool. VIII. 1880, p. 24.

*Cymenomus*, A. Milne Edwards, Bull. Mus. Comp. Zool. VIII. 1880, p. 26.

\**Cymonomops*.

#### *Uncertain in position.*

*Corycodus*, A. Milne Edwards, Bull. Mus. Comp. Zool. VIII. 1880, p. 23.

It appears to me to be quite possible that further investigation may discover *Cyclodorippe* to belong to Stimpson's genus *Tymolus*. Ortmann, (Zool. Jahrbucher, Syst. VI. 1892, p. 559) has already suspected the identity of these two genera.

*Caphyra*, Guérin, which was included with the *Dorippidae* by Milne Edwards, has by other authors been shown to belong to quite another section of the Brachynra; and I cannot think that *Cymopolia* either has any right to be classed with the *Oxytoma*. Previous authors also, such as Dana (U. S. Expl. Exped. Crust. pt. I. p. 403) and Miers ('Challenger' Brachyura p. 334) have suggested the advisability of removing *Cymopolia* from this group.

#### *Key to the Indian Genera of Dorippidæ*

- I. The external maxillipeds leave all the anterior part of the buccal cavern uncovered:—

1. The anterior extremity of the buccal cavern passes between the antennules to or even beyond the tip of the front: the afferent branchial apertures are

- situated in front of the bases of the chelipeds, a bridge of the carapace intervening ..... DORIPPE.
2. The anterior extremity of the buccal cavern either stops at, or does not reach as far as, the basal joint of the antennules: the afferent branchial openings are situated *immediately* in front of the bases of the chelipeds ..... ETHUSA.
- II. The external maxillipeds are greatly elongate and do not leave any appreciable portion of the buccal cavern uncovered: the afferent branchial openings are not situated in front of the bases of the chelipeds ..... CYMONOMOPS.

*Dorippe*, Fabricius.

*Dorippe*, Fabricius, Ent. Syst. Suppl. p. 361.

*Dorippe*, Milne Edwards, Hist. Nat. Crust. II. 154.

*Dorippe*, Miers, Challenger Brachyura, p. 327.

Carapace very flat, truncate-triangular and broadest behind, covering little more than the first two thoracic sterna, its regions well defined, the hepatic region small.

The front consists of two flat triangular teeth: on either side of it, in the same plane, are (1) a hood-like fold covering the base of the long completely exposed geniculate eyestalks, and separated by a deep narrow fissure from (2) a long flat triangular tooth, formed by the prolongation of the antero-external angle of the carapace, and forming the outer angle of the orbit. The floor of the orbit is even more incomplete than the roof, and is formed almost entirely by the base of a great projecting spine at the inner canthus, but even this spine may be rudimentary. The antennules fold longitudinally, they are too large to fold into the fossettes. The antennæ also are rather large: the basal joint is wedged in between the front and the spine at the inner canthus of the orbit.

The buccal cavern is abruptly narrowed anteriorly and prolonged as a deep well defined canal to, or even slightly beyond, the front: the canal is closed in below by long stout foliaceous processes of the first maxillipeds. The external maxillipeds do not cover this canal: their flagellum or palp arises at the outer angle of the long narrow merus and is completely exposed in flexion. The afferent branchial orifices are oblique pocket-like slits in the pterygostomian region.

The chelipeds in the adult male are commonly unequal, having the hand of one side much enlarged and swollen.

The first and second pairs of true legs are long stout and compressed: the last two pairs on the other hand are short and rather slight; they arise much dorsad of the other legs, and are subchelate,—the four subchelæ being so disposed as to enable the animal to hold over its back—as in a loose frame—some sort of defensive or protective object, such as a lamellibranch shell or an inhabited worm-tube.

The abdomen of both sexes consists of seven distinct segments, the first two and most of the third terga being visible in a dorsal view.

*Key to the Indian species of Dorippe.*

- I. The tips of the foliaceous processes that close the endostomial canal, but never the canal itself, may sometimes be seen between the frontal teeth in a dorsal view:—
  1. The greatest length of the carapace is slightly, but distinctly, more than the greatest breadth:—
    - i. Carapace nodular and wrinkled: spine at the inner canthus of the orbit ponderous, curved, serrated along the under surface: fourth (last) pair of true legs less than half the length of the second (longest) pair ..... *D. dorsipes.*
    - ii. Carapace smooth: spine at inner canthus of orbit rudimentary: fourth pair of true legs more than half the length of the second..... *D. astuta.*
  2. The greatest length of the carapace is less than the greatest breadth: spine at the inner canthus of the orbit long, slender, acute, straight: carapace smooth: fourth pair of legs from a little less than half to one-third the length of the second:—
    - i. Carapace and last two pairs of legs densely pubescent: both edges of merus and posterior edge of carpus and propodite of 1st and 2nd legs densely pubescent in the male ..... *D. facchino.*

- ii. Carapace hardly pubescent: last two pairs of legs very slightly hairy: 1st and 2nd legs perfectly devoid of hair .....

*D. granulata.*

- II. The roof of the endostomial canal projects considerably between the bases of the frontal teeth in a dorsal view: the greatest length of the carapace is hardly less than the greatest breadth: carapace smooth, it and all the appendages perfectly devoid of pubescence: spine at inner canthus of orbit rudimentary: last pair of legs much more than half the length of the second (longest) pair.....

*D. polita.*

97. *Dorippe dorsipes*, (Linn.) Miers.

*Cancer dorsipes*, Linn. Mus. Lud. Ulr. p. 452, and Syst. Nat. ed. xii. I. ii. 1053 (*nec syn.*)

*Cancer frasccone*, Herbst, Krabben, I. ii. 192, pl. xi. fig. 70.

*Cancer quadridentatus*, Fabricius, Ent. Syst. II. 464.

*Dorippe quadridentatus*, Fabricius, Ent. Syst. Suppl. p. 361: Bosc, Hist. Nat. Crust. I. 207: Latreille, Hist. Nat. Crust. et Ins. VI. 125, [and Encycl. pl. 306, fig. 1]: Desmarest, Consid. Crust. p. 135: De Haan, Faun. Japon. Crust. p. 121, pl. xxxi. fig. 3: Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 163: de Man, Journ. Linn. Soc., Zool., XXII. 1888, p. 206.

*Dorippe quadridentata*, Milne Edwards, Hist. Nat. Crust. II, 156: Hilgendorf, MB. AK. Berl. 1878, p. 812: E. Nauck, Zeits. Wiss. Zool. XXXIV. 1880, p. 49 (*gastric teeth*): Haswell, Cat. Austral. Crust. p. 137.

*Dorippe dorsipes*, Miers, Zool. H. M. S. 'Alert,' pp. 185, 257: de Man, Archiv. für Naturges. LIII. 1887, i. 393: [Cano, Boll. Soc. Nat. Napol. III, 1889, p. 254]: Ortmann, Zool. Jahrbuch., Syst., VI. 1892, p. 562: Henderson, Trans. Linn. Soc. Zool. (2) V. 1893, p. 404.

*Dorippe atropos*, Lamarck, Syst. Anim. sans. vert. p. 245 (1818).

*Dorippe nodulosa*, Lamarck, Syst. Anim. sans. vert. p. 245 (1818): Bosc, Hist. Nat. Crust. I. 203, pl. iv. fig. 2; Guérin, Icon. Règne Animal, pl. xiii. fig. 2.

Body and appendages (except the hands and fingers, and the propolites and dactyli of the 1st and 2nd true legs) rather thickly covered with hair.

Extreme length of carapace greater than extreme breadth. Surface of carapace wrinkled and uneven, with about a dozen nodules which are often granular; the regions well defined by grooves and puckers.

The spine at the outer angle of the orbit is long and acute, and usually projects well beyond the level of the frontal teeth: the spine at the inner canthus is huge, curved, serrated along the lower border,

and projects far beyond the frontal teeth: the hood-like fold, on either side of the front, that covers the base of the eyestalks, has its angles not pronounced.

The lateral margins of the carapace are denticulated up to a stoutish tooth near the middle of the branchial border.

The abdomen of the male has both on the second and on the third terga a transverse row of 3 tubercles, the middle one large rounded and polished, the lateral ones smaller and acute, and one stout tubercle in the middle line on the fourth tergum: in the female the third fourth and fifth terga are transversely carinate, the carinæ being denticulate, and one tooth on the third and 4th terga, in the middle line, being much enlarged; the second tergum is also transversely carinate, but bluntly and indistinctly.

The chelipeds of the adult male are asymmetrical, the hand of one side being greatly swollen and being a good deal broader than long: in both chelipeds the ischium merus and carpus have the outer surface covered with spinules and acute granules.

The second true leg is more than twice the length of the fourth, and nearly three times the length of the carapace: its carpus like that of the first is traversed longitudinally by two granular crests.

Large males have the carapace 36 millim. long, and 34 millim. in extreme breadth: ovigerous females have the carapace 25 millim. long by 24 millim. broad.

In the Indian Museum collection are very numerous specimens from Mergui, Andamans, East coast of India from Ganjam to Palk Straits, and Persian Gulf.

As Miers states, there can be little doubt that Linnæus' diagnosis (Mus. Lud. Ulr. p. 452) refers to this species. But De Haan long before (Faun. Japon. Crust. pp. 121, 139) had bespoken the identity of *D. dorsipes* and *D. quadridens* and had noticed the confusion by earlier authors of *Cancer dorsipes* of Linnæus with *Cancer dorsipes* of Fabricius.

#### 98. *Dorippe facchino* (Herbst), De Haan.

*Dorippe facchino*, Herbst, Krabben, I. ii. 190, pl. xi. fig. 68: De Haan, Faun. Japon. Crust. p. 123: Stimpson, Proc. Acad. Nat. Sci. Philad. 1858, p. 163: Miers, 'Challenger' Brachyura, p. 328: Ortmann, Zool. Jahrbuch., Syst. VI. 1892, p. 561: J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 405.

*Dorippe sima*, Milne Edwards, Hist. Nat. Crust. II. 157, pl. xx. figs. 11-14: Dana, U. S. Expl. Exp. Crust. pt. I. p. 398: Miers, Ann. Mag. Nat. Hist. (5) V. 1880, p. 317: A. O. Walker, Journ. Linn. Soc., Zool., XX. 1886-90, p. 111.

The body and appendages though on the whole very hairy, are not quite so hairy as in *D. dorsipes*; the chelipeds have the hair confined almost entirely to their borders, especially the upper border; the 1st and 2nd pairs of legs are almost hairless in the female, and in the male have the hair confined to the anterior border of the merus and the posterior border of the merus carpus and propodite; and hair is absent from the convexities of the thoracic sterna.

Extreme length of carapace considerably less than extreme breadth.

The surface of the carapace, when denuded, is either perfectly smooth, or smooth in the middle and finely granular at the sides and in front: the regions are well defined by grooves.

The hood-like fold covering the base of the eyestalks, on either side of the front, has its inner or anterior angle dentiform: the spine at the external orbital angle is broad and suddenly acuminate, and projects to but not beyond the level of the frontal teeth: the spine at the inner canthus is slender, straight, and acute, and projects well beyond the frontal teeth.

The lateral borders of the carapace are sometimes granular, but never denticulate.

The abdomen of the male is unarmed: in the female the 3rd-5th terga are coarsely and bluntly carinate, the carinæ of the 4th and 5th being finely granular. The chelipeds when denuded have all their joints quite smooth: those of the adult male are asymmetrical just as in *D. dorsipes*.

The second true leg is much more than twice, often three times, the length of the fourth, and  $2\frac{1}{3}$  to  $2\frac{2}{3}$  times the length of the carapace: its carpus, like that of the first is bicarinate, the carinæ being granular under the lens but not to the naked eye.

Large males have the carapace 29 millim. long and 34 millim. in extreme breadth: ovigerous females have the carapace 20 millim. long by 24 millim. broad.

In the Indian Museum are very numerous specimens from the East coast from the mouth of the Hooghly to Madras, and a few from the Andamans. It is common on soft muddy bottoms, and I have rarely found it without a protective bivalve shell and sea-anemone.

#### 99. ? *Dorippe granulata*, De Haan.

*Dorippe granulata*, De Haan, Faun. Japon. Crust. p. 122, pl. xxxi. fig. 2: Stimpson Proc. Acad. Nat. Sci. Philad., 1858. p. 163: [Targioni-Tozzetti, Zool. Record, 1877, Crust. p. 19]: Ortmann Zool. Jahrbuch., Syst., VI. 1892, p. 561.

Almost exactly resembles *D. facchino* (Herbst), but has the carapace a little more granular and with scanty or obsolete pubescence.



There is almost no hair on the carapace,—none sufficient to conceal its grooving and texture : on the chelipeds there is, on the upper edge, extending along basal part of finger, a narrow fringe of hair, and on the lower edge a narrow fringe extending as far as the end of the merus : on the first two pairs of true legs there is no hair at all in either sex ; and on the last two pairs of legs there is not very much hair.

The chelipeds of males that are as big as the largest ovigerous females are hardly asymmetrical.

Ovigerous females have the carapace 14 millim. long and 16 millim. in extreme breadth.

In the Indian Museum collection are 21 specimens from various stations along the shores of the Bay of Bengal from Mergui to Madras, one of these—the smallest and most immature of all—belongs to Dr. Anderson's Mergui collection and is referred to in Dr. de Man's report (J. L. S., Zool., Vol. XXII) as allied to *D. granulata*.

If they are not De Haan's species, they are a mere variety of *D. facchino*.

#### 100. *Dorippe astuta*, Fabr.

*Dorippe astuta*, Fabricius, Ent. Syst. Suppl. p. 361.

*Cancer astutus*, Herbst, Krabben, III. iii. 45, pl. lv. fig. 6.

*Dorippe astuta*, Bosc, Hist. Nat. Crust. I. 208 : Milne Edwards, Hist. Nat. Crust. II. 157 : Haswell, Cat. Austral. Crust. p. 136 : A. O. Walker, Journ. Linn. Soc., Zool., Vol. XX. 1886-90, p. 111 : Ortmann, Zool. Jahrbuch., Syst., VI. 1892, p. 562 : Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 405.

Body and appendages not pubescent as in *D. dorsipes* and *facchino*, but covered with short distant hairs that are not very plainly visible to the naked eye : the hairs on the edges of the propodites and dactyli of the first two pairs of true legs, however, form a long thick fringe.

The carapace is extremely flat, almost laminar ; its surface is smooth, and the regions are defined by grooves.

Extreme length of carapace a little greater than extreme breadth.

The spine at the outer angle of the orbit does not nearly reach to the level of the tip of the frontal teeth : the part of the carapace that covers the base of the eyestalk is not hood-like, and has not its angles pronounced : the spine at the inner canthus of the orbit is quite rudimentary.

The lateral margins of the carapace are smooth. The abdomen of the male is unarmed, that of the female has the 3rd and 4th terga bluntly and very inconspicuously carinate transversely.

The chelipeds are smooth when denuded ; in the adult male they are asymmetrical just as in *D. dorsipes* and *facchino*.

The second true leg is three times as long as the carapace, and very much less than twice the length of the fourth leg.

The adult male has the carapace 12 millim. long and 11.5 millim. broad, as has also the apparently adult female.

In the Indian Museum collection are eight specimens from the Andamans, Mergui, Orissa coast, and Karachi.

Several of them are encrusted with a small species of *Scalpellum*, and one carries across its back a large (inhabited) worm-tube, which is said by Dr. Giles to be a habit with this species.

#### 101. *Dorippe polita*, Alcock and Anderson.

*Dorippe polita*, Alcock and Anderson, J. A. S. B., Vol. LXIII. 1894, pt. 2, p. 208, and Ill. Zool. 'Investigator,' Crustacea, pl. xxiv. fig. 4 (in the press).

General surface of the body and appendages smooth hard polished and free of hairs: there are a few scanty hairs on the edges only of some of the joints of the chelipeds and external maxillipeds.

The extreme length of the carapace is a very little less than the extreme breadth: the grooves that define the regions are shallow and not very conspicuous. The end of the endostomial channel projects between, and a little beyond the tips of the frontal teeth; and has its free edge emarginate, so that the front appears to consist of four sharp lobes, the median two of which are on a lower level than the other two.

The spine at the outer angle of the orbit is broadly triangular, its tip scarcely surpasses the level of the tips of the frontal teeth: the spine at the inner canthus is blunt and very small and inconspicuous: the portion of the carapace that covers the base of the eyestalk is, as in *D. astuta*, in simple continuity with the side of the front.

The abdominal terga of the female are smooth and polished.

The second pair of true legs are about  $2\frac{1}{3}$  times the length of the carapace and are very much less than twice the length of the fourth pair; their carpopodites, like those of the first pair, are faintly bicarinate. The pleura covering the bases of the last two pairs of legs are singularly large.

The larger of two ovigerous females in the Indian Museum collection has the carapace 11.5 millim. long and 12 millim. in extreme breadth.

#### *Ethusa*, Roux.

*Ethusa*, Roux, Crust. de la Méditerranée, pl. xviii. and text relating thereto.

*Ethusa*, Milne Edwards, Hist. Nat. Crust. II. 161.

*Ethusina*, S. I. Smith, 'Albatross' Crustacea, 1883, in Ann. Rep. U. S. Comm. Fish, &c., 1882 (1884).

*Ethusa*, Miers, 'Challenger' Brachyura, pp. 328, 331.

Carapace shaped much as in *Dorippe*. The front consists of two laminar teeth each of which again is bifid at tip: on either side of the front, and separated from it by a deep cleft, is a long flat tooth or spine formed by the prolongation of the antero-external angle of the carapace, and forming the outer angle of the orbit. There is practically no orbital floor. The antennules fold obliquely: they are large, but fold fairly well into their fossæ. The antennæ have a long flagellum: their basal joint is inserted between the eyestalk and the basal antennular joint, but on a slightly lower level.

The buccal cavern is elongate-triangular and does not extend to the front: the external maxillipeds cover only its basal three-fourths, or thereabout, somewhat as in *Dorippe*, but the distal part is closed in by stout foliaceous processes of the first maxillipeds. The flagellum or palp of the external maxillipeds arises near the antero-external angle of the rather broad merus, and is completely exposed in flexion.

The afferent branchial orifices are wide openings immediately in front of the bases of the chelipeds.

The chelipeds in the adult male are often unequal: the legs have the same form and relations as in *Dorippe*, but the last two small and dorsally placed pairs are not subchelate, although their little hook-like dactylus folds backwards. The dactyli of the 1st and 2nd pairs are palmulate and are very long and stout. The abdomen of the male usually consists of 5 pieces, the 3rd-5th terga being fused, that of the female consists of 7 separate terga. As in *Dorippe* the first three terga are visible in a dorsal view.

There is very little hair about the carapace and larger appendages.

In the Indian seas the species of this genus are, so far as is known, found only at depths of between 200 and 1,300 fathoms.

#### *Key to the Indian species of Ethusa.*

I. Carapace barely longer than broad: basal antennular joint not abnormally enlarged and swollen: eyestalks freely movable:—

1. Branchial regions much swollen, and causing a strong bulge of the lateral borders of the carapace posteriorly: external orbital spines long slender acute, and projecting obliquely:—

i. External orbital spines projecting beyond the frontal spines ..... *E. indica*.

ii. External orbital spines not projecting to the level of the frontal spines ... *E. pygmaea*.

2. Lateral borders of the carapace gradually convergent without any strong bulge in their posterior (branchial) part: external orbital spines short broad flat triangular, with a mucronate tip ..... *E. andamanica*.
- II. Carapace manifestly longer than broad: basal antennular joint enormously enlarged and swollen, globular in shape, pushing the eyes permanently outwards:—
1. Eyes practically immobile: chelipeds in the male symmetrical..... *E. investigatoris*.
2. Eyes preserving good power of movement: one cheliped in the male very markedly larger than the other..... *E. desciscens*.

102. *Ethusa indica*, Alcock.

*Ethusa indica*, Alcock, Ann. Mag. Nat. Hist., May, 1894, p. 405, and Ill. Zool. 'Investigator,' Crust. pl. xiv. fig. 2, ♀.

Carapace convex; its extreme length, including the frontal teeth, in the male only just exceeds, and in the female equals, its extreme breadth; its surface is finely and closely granular almost everywhere, except sometimes on the cardiac-intestinal region.

The branchial regions are much swollen, both dorsally and laterally, the lateral swelling making the carapace more than one-third broader across the middle of the branchial regions than across the bases of the external orbital spines. The cardiac-intestinal region is small and well defined, and although it is tumid it is commonly sunk below the level of the branchial convexities. The anterior regions of the carapace are undefined.

The spine at the external orbital angle is broad-based, but long slender and acute: it projects obliquely outwards well beyond the tips of the frontal teeth. The two pairs of frontal teeth are longish and acute—the outer pair being somewhat the longer: they as well as the external orbital spine are a good deal concealed in a fringe of long hairs.

The eyestalks are short slender and freely movable: the eyes are often a little deficient in pigment.

The basal antennular joint is not abnormally enlarged.

The chelipeds in the adult male only are asymmetrical, all the joints of one side being enlarged in all dimensions: the smaller cheliped is hardly as stout as the first two pairs of legs.

The second pair of true legs are not very much longer than the first: in the adult male they are a little more than three times the

length of the carapace, and slightly more than three times the length of the 4th (last) pair; in the female they are not quite three times the length of the carapace, and about  $2\frac{3}{4}$  times the length of the 4th pair.

The abdomen of the male consists of 5 pieces, the 3rd-5th terga being fused together.

The extreme length of the carapace is in the fully adult male 16.5 millim., in the fully adult female 15 millim.; the breadth 16 millim. in the male, 15 millim. in the female.

Has been dredged in the Andaman Sea at 240 fms., in the "Swatch" of the Gangetic Delta at 409 and at 405 to 285 fms., in the Laccadive Sea at 696 fms., off the Maldives at 719 fms., and off both coasts of Ceylon at 406 to 296 fms.

### 103. *Ethusa pygmaea*, Alcock.

*Ethusa pygmaea*, Alcock, Ann. Mag. Nat. Hist., May 1894, p. 406, and Ill. Zool. 'Investigator,' Crust. pl. xiv. fig. 5, ♀.

Distinguished from *E. indica* only in the following particulars:—

(1) its size is much smaller, the largest known specimen—an ovigerous female—having the carapace slightly over 6 millim. long and nearly 7 millim. broad:

(2) the external orbital spines, though of the same slender acute shape, are not so prominent, not reaching as far as the tips of the frontal teeth:

(3) the anterior regions of the carapace are plainly defined by grooves.

Andaman Sea 188 to 220 fathoms, and 240 to 220 fms.

### 104. *Ethusa andamanica*, Alcock.

*Ethusa andamanica*, Alcock, Ann. Mag. Nat. Hist., May 1894, p. 405, and Ill. Zool. 'Investigator,' Crust. pl. xiv. fig. 8, young ♀.

Carapace flat, its extreme length only just exceeds its extreme breadth, its surface finely granular under the lens, but smooth to the naked eye.

The branchial regions are a little tumid dorsally, but do not bulge laterally, so that the convergent lateral borders are nearly straight.

The external orbital spine is broadly triangular, with a mucronate tip which does not quite reach to the tips of the frontal spines; these also are acutely triangular, and all are a good deal hidden by a fringe of long hairs.

The eyestalks are short and rather stout, movable, but not very freely so: the eyes are not deficient in pigment. The basal antennular joint is not enlarged.

The chelipeds of the adult male are unknown : in the female they are not so stout as the first two pairs of legs.

The second pair of legs in the female (adult male unknown) exceed the first almost by the length of the dactylus, they are three times the length of the carapace and about  $2\frac{1}{2}$  times the length of the 4th pair.

The extreme length of the carapace of the largest specimen, which is not adult, is 9.5 millim., the extreme breadth 9 millim.

Andaman Sea 188 to 220 fms., and 238 to 290 fms.

This species may possibly be only a variety of *Ethusa orientalis*, Miers, Challenger Brachyura, p. 330, pl. xxviii. fig. 4.

105. *Ethusa (Ethusina) investigatoris*, n. sp.

Carapace manifestly longer than broad, somewhat convex, smooth to the naked eye though finely granular under the lens.

The branchial regions are a good deal swollen both dorsally and laterally, bulging out the lateral margins and making the carapace a third broader across the middle of the branchial regions than across the bases of the external orbital spines.

The cardiac-intestinal region is well-defined and tumid, but not sunk below the level of the branchial convexities : the anterior regions of the carapace are fairly well defined.

The frontal portion of the carapace is separated from the rest of the carapace by a transverse groove or crease. The external orbital spine is long and needle-like, but its tip falls considerably short of the tips of the rather long acute frontal spines.

The basal antennal joint is huge and swollen, almost globular in shape. Owing to its size the eyes are pushed outwards until the eye-stalks have come to lie almost in the transverse axis of the carapace, with the tips of the eyes just visible, dorsally, beyond the lateral edge of the external orbital spine ; and in this position they are almost immovably fixed.

The chelipeds in the apparently adult male are symmetrical and are not much stouter, except as to the hands, than the first two pairs of legs ; the hands, however, are somewhat enlarged.

The second pair of true legs exceeds the first by about a third of the length of the dactylus ; they are more than three times the length of the carapace, and about  $2\frac{1}{4}$  times the length of the 4th pair.

The abdomen of the male consists of 5 pieces, the 3rd-5th terga being fused together.

Length of carapace of an adult male 12.3 millim., extreme breadth 11.3 millim.

Colours in life milk-white with the tip of the legs faint pink.

Bay of Bengal 1300 fathoms, Laccadive Sea 1200 fms.

This species may possibly be only a variety of *Ethusa* (*Ethusina*) *gracilipes*, Miers, Challenger Brachyura, p. 332, pl. xxix. fig. 1.

106. *Ethusa* (*Ethusina*) *desciscens*, n. sp.

Only differs from *E. investigatoris* (1) in its smaller size, (2) in having the eyestalks somewhat more mobile, and (3) in having the hand of one cheliped (in the male) much larger than the other.

I should have regarded it as a variety of *E. investigatoris* but that two specimens coming from very different localities and depths present the same peculiarities.

Length of carapace of largest specimen 9 millim., extreme breadth 8 millim.

Andaman Sea 265 fathoms, Laccadive Sea 912 to 931 fms.

*Cymonomops*, Alcock.

*Cymonomops*, Alcock, Ann. Mag. Nat. Hist., May 1894, p. 406.

Allied to *Cyclodorippe*, *Cymonomus*, etc.

Carapace of the *Dorippe* type (that is to say having its greatest breadth at its extreme posterior limit and leaving about half of the abdominal terga exposed to dorsal view), but arched anteriorly almost in a semicircle; its regions well defined in much the same way as *Dorippe*. The front is narrow and the whole fronto-orbital region lies well inside the semicircular curve of the antero-lateral margins: the narrow front ends in two little teeth between and beyond which can be seen the roof of the greatly prolonged buccal cavern, as in *Dorippe polita*. On either side of the front is a spine that forms the roof of the orbit, and outside of this spine, and separated from it by a deep notch, is a spine that forms the outer wall of the orbit.

The eyestalks are slender, moderately long, and freely movable: the eyes are almost without pigment.

The antennules have their basal joint lodged in a deep crevice between the edge of the anterior prolongation of the buccal cavern and the antennæ: their long flagellum cannot be concealed in flexion. The antennæ are large, but are much smaller than the antennules.

The buccal cavern is of great size,—not much less than half the length of the body, and is gradually narrowed anteriorly, and prolonged beyond the tip of the front: it is closed, except at its extreme frontal tip, by the long narrow external maxillipeds, the merus of which is not very much shorter than the ischium measured along the inner border and the flagellum of which is exposed in flexion: the long narrow pointed exognath is not much longer than the ischium. beneath the

external maxillipeds the anterior prolongation of the buccal cavern is closed in below by a lamellar process of the first maxillipeds.

The chelipeds in both sexes are short, massive, and equal and symmetrical: the hands are of the chopper-shaped, almost subcheli-form, Ranioid type, the stout fingers being almost at right angles to the long axis of the hand.

The first and second pairs of true legs are stout and are of great length, their merus being of relatively enormous length: the third and fourth pairs on the other hand, which are dorsal in position as in *Dorippe*, are extremely short and of filiform tenuity.

The abdomen in both sexes consists of six segments: in the male two or three of them are fused and the whole abdomen is very small, in the female the last segment is of great size.

[? The afferent branchial opening appears to lie in the deep crevice between the base of the antennæ and the edge of the buccal frame in which the basal joint of the antennules is lodged.]

#### 107. *Cyonomops glaucomma*, Alcock.

*Cyonomops glaucomma*, Alcock, Ann. Mag. Nat. Hist., May 1894, p. 406, and Ill. Zool. 'Investigator,' Crustacea pl. xiv. fig. 9.

Carapace subcircular; it and the appendages are very closely and finely granular beneath a dense pubescence. The front consists of three deeply cut lobes, the middle one of which is the true front and is the largest and most prominent. The middle lobe again is slightly cleft at the tip, and in the cleft is to be seen projecting the roof of the remarkably prolonged buccal cavity.

The external orbital angle, which is somewhat ventrad in position, also forms a projecting tooth, so that the orbito-frontal region, which is sharply delimited from the rest of the inflated carapace, has the form of a five-pronged crest or crown. The regions of the carapace are plainly delimited, excepting only in the case of the boundary between the gastric and cardiac regions. The pterygostomian regions are most remarkably puffed out.

The abdomen (in the female) is large, and the terminal segment has the form of a broad semicircular plate, broader than any of the other segments and nearly as long as all of them put together: in the male the abdomen is very small.

The orbits are capacious, but the eyestalks are slender and the eyes are unpigmented and semi-opaque.

The antennules, which are much larger and longer than the antennæ, are incapable of flexion beneath the front.

The external maxillipeds are of great length, in correspondence with



the remarkable trough-like prolongation of the buccal cavity, which they completely close in below; their meropodite, which is prolonged far beyond the insertion of the palp, covers the bases of the antennules and antennæ, their tips in fact being visible from above; the slender exopodite does not much surpass the ischium.

The chelipeds are short but massive, and are equal, the merus is curved, the carpus is very small, the palm is large and tumid, and the fingers which are set almost at right angles to the hand, are broad, compressed, pointed, very closely apposable, and have their cutting-edge very finely denticulated.

The second and third legs are of great length, being more than four times the length of the body, the merus forming more than half their extent; their dactylus is filiform and is not much longer than their protopodite. The fourth and fifth legs have the family position, but are mere rudiments, being of hair-like tenuity and only about three-fourths of the carapace in length; the fifth ends in a hook-like dactylus.

A female from the Andaman Sea, 405 fathoms, has the following dimensions:—Length of carapace 6·5 millim., breadth 6·5 millim., length of cheliped 9 millim., length of second leg 28·5 millim., of fourth leg 4·5 millim. A male from the Andaman Sea, 265 fathoms, is smaller.

Colour in the fresh state chalky pink.

#### Family RANINIDÆ.

*Raniniens*, Milne Edwards, Hist. Nat. Crust. II, 190.

*Raninoidea*, De Haan, Faun. Japon. Crust. p. 136.

*Raninidea*, Dana, U. S. Expl. Exp. Crust. pt. I. pp. 400, 403.

*Raninidea*, Henderson, 'Challenger' Anomura, p. 26.

Carapace much longer than broad, remarkably elongate and convex from side to side, commonly obconical or obovate in outline, the greatest breadth being at or close behind the level of the front. Abdomen narrow in both sexes, the greater number of the terga fully exposed in a dorsal view. The sternum is elongate, broad between the first pair or first two pairs of legs, and then becoming narrow and finally linear.

The true front is narrow: in the same plane with it the antero-external angle of the orbit is usually produced, somewhat as in *Dorippe*, to form a spine; and between the two is the orbit.

Except in the deep-sea forms the eyestalks are long. The orbits are very complete, except sometimes on the ventral aspect, where the large basal joints of the antennules and antennæ serve in large part as an orbital floor.

The antennules are large, but do not fold into fossettes. The antennæ also are large, and arise on a plane more or less ventrad of the antennules.

The buccal cavern is remarkably elongate, and is completely closed by the external maxillipeds. As in all other *Oxystoma* the efferent branchial channels form a canal in the middle of the endostome, which canal is covered by a lamellar prolongation of the exopodites of the first maxillipeds: as in *Dorippe* the canal is prolonged forwards between the bases of the antennules.

As in the *Leucosiidæ* the afferent branchial channels are not found in front of the bases of the chelipeds.

Somewhat in the same way as in the *Leucosiidæ* the palp of the external maxillipeds is small and arises at the far end of a groove along the inner edge of the merus, so as to be completely concealed in repose: the exognath is very narrow, and, as in the *Tymolinæ*, does not reach very far beyond the end of the ischium of the endognath.

Except in *Zanclifer* the chelipeds have the hand broad flat and somewhat chopper-shaped, the fingers (which form the head of the chopper) being at right angles, or nearly so, with the long axis of the hand; and as the immobile finger springs from a very broad base, the chelæ rather resemble subchelæ.

The legs commonly have the propodite broad or foliaceous, and the dactylus foliaceous or very broadly palmulate, somewhat as in *Matuta*: the last pair of legs is in, and the penultimate pair approaches, the dorsal plane of the body.

The genital ducts of the male perforate, and protrude far beyond, the bases of the fifth pair of legs: those of the female perforate the bases of the third pair of legs.

The following genera belong to this family. Indian genera are printed in Roman type and those represented in the Indian Museum collection are marked with an asterisk:—

#### Family **Raninidæ**.

\* *Cosmonotus*.

\* *Lyreidus*.

\* *Notopus*.

*Notopoides*, Henderson, 'Challenger' Anomura, p. 29.

*Ranilia*, Milne Edwards, Hist. Nat. Crust. II. 195.

\* *Ranina*, Lamarck, Milne Edwards, Hist. Nat. Crust. II. 191

\* *Raninoides*.

*Raninops*, A. Milne Edwards, Bull. Mus. Comp. Zool. VIII. 1880, p. 34.

*Zanclifer*, Henderson, 'Challenger' Anomura, p. 34.

## Key to the Indian genera of Raninidae.

I. Last pair of legs of normal size: antennae with a very stout peduncle that hides the antennules: antennary flagellum long and stiff:—

1. A well-developed rostral spine..... *Notopus*.
2. A V-shaped excision in the carapace in place of a rostrum..... *Cosmonotus*.

II. Last pair of legs abnormally small and slender—almost filiform: antennary peduncle not completely hiding the antennules: antennary flagellum small:—

1. Fronto-orbital border more than half the width of the carapace: sternum broad as far as the third pereopods: merus of the external maxillipeds shorter than the ischium ..... *Raninoides*.
2. Fronto-orbital border less than half the width of the carapace: sternum broad only as far as the second pereopods: merus of the external maxillipeds a little longer than the ischium ..... *Lyreidus*.

*Notopus*, De Haan.

*Notopus*, DeHaan, Faun. Japon. Crust. pp. 137, 138.

*Notopus*, Henderson, 'Challenger' Anomura, p. 31.

Carapace obovate or obconical in outline, strongly convex from side to side, nearly smooth: regions undefined. Fronto-orbital border more than half the breadth of the carapace. Eyes distinct, cystalks long slender and cylindrical, orbits oblique.

Antennules much smaller than the antennae. Antennae with a long very stout peduncle and long stout flagellum, the peduncle concealing the antennular peduncle. Merus of the external maxillipeds a little shorter than the ischium, and having its inner border thickened and raised. Sternum broad between the chelipeds and then suddenly becoming very narrow. Last pair of legs of normal size, arising a little in advance of the penultimate pair.

The abdomen in both sexes has all 7 terga separate.

108. *Notopus dorsipes*, (Fabr.) De Haan.

*Pelliculus marinus*, Ramph, Amboin. Rariteitk. I. 29, pl. x. fig. 3.

*Hippa dorsipes*, Fabricius, Ent. Syst. II. 475.

*Albunea dorsipes*, Fabricius, Ent. Syst. Suppl. p. 397.

*Ranina dorsipes*, Latreille, Hist. Nat. Crust. et Ins. VI. 133, [and Encycl. Method. X. 268. pl. 287, fig. 2]: Milne Edwards, Hist. Nat. Crust. II. 195.

*Notopus doctopus*, DeHaan, Faun. Japon. Crust. p. 139, pl. xxxv. fig. 5. Stuler, Abh. Ak. Berl. 1882 (1883) p. 17, pl. i. figs. 6 a-b and pl. ii. figs. 7 a-d.)

The greatest breadth of the carapace—at the fronto-orbital border—is about two-thirds the greatest length.

On the fronto-orbital border are 5 spines of about equal size, separated by deep bights, the middle spine being the true front or rostrum: the outermost spines on either side form the antero-external angles of the carapace, are on a different plane from the others, and are joined across the carapace by a serrated ridge.

The carapace is a good deal pitted in the centre: the lateral borders in their anterior half have, like the surface of the merus of the external maxillipeds and of the greater part of the pterygostomian region, numerous squamiform granules; in their posterior half the lateral borders are finely raised, and milled. A raised ridge traverses the carapace in the middle line from the tip of the front nearly to the posterior border. The trigonal ischium of the chelipeds is somewhat swollen and has its outer surface tattooed with linear dents with hairy edges; the carpus has its dorsal surface serrated; the hand has hairy linear dents and squamiform rows of serrations on both its surfaces, but especially on the outer; and the dactylus has a smooth cutting edge and closes against a single distinctly large tooth at the tip of the immobile finger.

The true legs have one or both edges of many of their joints scantily fringed with long stiff hairs: except in the case of the last pair—in which the carpopodites and propodites are foliaceously expanded—these joints are only moderately expanded; and except in the case of the penultimate pair—in which the dactylus is foliaceous—this joint is broadly palmulate.

In the Indian Museum collection are specimens from the Andamans, and from off the Malabar coast 45 fathoms.

### *Cosmonotus*, Adams & White.

*Cosmonotus*, Adams & White, 'Samarang' Crust. p. 60, 1848.

*Cosmonotus*, Dana, U. S. Expl. Exp., Crust. pt. I. p. 401.

*Cosmonotus*, Henderson, 'Challenger' Anomura, p. 32.

Carapace elongate-heptagonal in outline, strongly convex, the summit of the convexity forming a sharp mid-dorsal ridge. *Instead of a "front" there is a V-shaped excision*, filled by the basal joints of the eyestalks. The eyes are distinct, the eyestalks are slender and are of remarkable length: each orbit forms a narrow trench just beneath and along almost the whole length of either anterior border of the carapace, the two orbits together forming a very perfect and obvious V.

The antennules are almost hidden by the much larger and stouter antennæ, as in *Notopus*.

The maxillipeds, legs, sternum and abdomen are as in *Notopus*.

#### 109. *Cosmonotus grayii*, Ad. & Wh.

*Cosmonotus grayii*, Adams and White, 'Samarang' Crust. p. 60, pl. xiii. fig. 3 (P. Z. S. 1847, p. 227, fig., and Ann. Mag. Nat. Hist. (2) II. 1848, p. 257): Stimpson, Proc. Acad. Nat. Sci. Philad. 1858, p. 241: Henderson, 'Challenger' Anomura, p. 33: [Cano, Boll. Soc. Nat. Napol. III. 1889, p. 256].

The carapace is unevenly covered with pits and dents which give it, when examined with a lens, a somewhat squamiform appearance. There is a small denticle on either side of the frontal notch and a claw-like spinule at either antero-external angle of the carapace—this is all the armature. The pterygostomian region is granular. The outer edge of the exognath is thickly fringed with hair, the merus and the outer margin of the ischium of the endognath are granular.

The chelipeds are hairy along the dorsal edge, and the edges of the legs—of the last pair especially—are hairy. The chelipeds are also a good deal pitted and dented, like the dorsum of the carapace.

The movable finger is rather strongly curved, and owing to the prominence of a single tooth just beyond the middle of the cutting edge, is curiously sickle-shaped.

In the Indian Museum collection is a single male from the Persian Gulf.

#### *Raninoides*, Milne Edwards.

*Raninoides*, Milne Edwards, Hist. Nat. Crust. II. 196.

*Raninoides*, Henderson, 'Challenger' Anomura, p. 27.

Carapace remarkably elongate-obovate, strongly convex from side to side, about twice as long as broad, its surface for the most part smooth, the regions undefined. Fronto-orbital border slightly less than the greatest width of the carapace. Eyes small but distinct, eyestalks broadly dilated at base, orbits slightly oblique.

Antennules about equal in size to the antennæ: antennæ with a stout peduncle and a rather short slender flagellum, the peduncle not concealing the antennular peduncle. Merus of the external maxillipeds shorter than the ischium; its edges slightly thickened and raised. Sternum broad between the chelipeds and as far as the bases of the second pair of true legs, then becoming extremely narrow.

Last pair of legs abnormally short and slender, arising much in advance of the penultimate pair. The abdomen in both sexes consists of 7 separate segments.

110. *Raninoides personatus*, White, Henderson.

*Raninoides personatus*, White MS., Henderson 'Challenger' Anomura p. 27 pl. ii. fig. 5.

Carapace twice as long as broad. The lateral border in its posterior half is defined by a fine raised and milled line, and at either external orbital angle is prolonged into a spine, at a distance behind which equal to the distance between it and the rostrum is a second smaller, but still large, spine. The carapace between the two latter spines is finely punctate and in places granular, elsewhere it is smooth and polished.

The front consists of three teeth, the middle one of which alone is large and prominent forming the true rostrum, the lateral teeth being small: between each of these small lateral teeth and the external orbital spine, and separated from both by a fissure, is an angular lobe that completes the roof of the orbit. The whole fronto-orbital border is hairy. The pterygostomian regions are densely granular in a well defined band that occupies much more than their outer half.

The chelipeds have the ischium armed distally, on its inner border with a sharp slender spine: two similar spines occur towards the distal end of the carpus—the larger one being on the outer border, the smaller on the dorsal surface: a similar spine is found towards the far end of the outer border of the hand, and three occur along the inner border of the hand: the dactylus has a smooth cutting edge, but the opposed edge of the immobile finger is very sharply lacinate up to a sharp terminal spine. There is no spine on the outer edge of the dactylus. The third pair of true legs has its merus on both edges and the other joints on the posterior edge fringed with long stiff hairs, the second pair has similar hairs on the posterior edge of merus carpus and propodite, the first pair on lower edge of propodite.

Excluding the filiform last pair, the other legs have the carpus dorsally carinate, and the propodite and dactylus foliaceous.

In the Indian Museum collection are numerous specimens from the coasts of the Bay of Bengal, from 12 to 70 fathoms.

111. *Raninoides serratifrons*, Henderson.

*Raninoides serratifrons*, Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 408, pl. xxxviii. figs. 10-12.

Differs from *R. personatus* Henderson in the following particulars:—

(1) the rostrum is carinated, and it, as well as the dentiform lobe at either side of its base, has the edge sharply clearly and uniformly serrated:

(2) between the dentiform lobe at the base of the rostrum and the

external orbital spine is, not an angular lobe, but a sharp spine :

(3) the spine on the lateral border behind the external orbital spine is a mere spinule, and the carapace in front of a well defined transverse line that connects these spines is covered with small squami-form granules :

(4) there is no spine on the ischium of the chelipeds ; the wrist has its dorsal surface closely covered with somewhat scale-like granules ; the hand has its inner surface covered, but not nearly so closely, with rather larger granules and has its outer edge sharply bicarinate :

(5) the dactylus of the second and third pairs of true legs is sickle-shaped :

(6) the small last pair of legs are stouter.

In the Indian Museum collection are two specimens—a small female from off Ceylon 28 fms., and a large female from off the Malabar coast 45 fms.

### *Lyreidus*, De Haan.

*Lyreidus*, DeHaan, Faun. Japon. Crust. p. 138.

*Lyreidus*, Henderson, 'Challenger' Anomura, p. 33.

Carapace elongate-obovate, the antero-lateral margins independent and gradually convergent ; strongly convex from side to side and slightly convex from before backwards ; smooth and polished, with the regions undefined. Fronto-orbital border less than half the breadth of the carapace. Eyes small ; eyestalks short, broad at base, orbits hardly oblique.

Antennules about equal in size to the antennæ : antennæ with a stoutish peduncle and rather short slender flagellum, the peduncle not concealing the antennular peduncle.

Merus of the external maxillipeds a little longer than the ischium.

Sternum broad as far as the bases of the first pair of true legs, then becoming narrow. Last pair of legs abnormally short and slender, arising well in advance of the posterior pair. The abdomen in both sexes consists of 7 distinct segments.

### 112. *Lyreidus channeri*, Wood-Mason.

*Lyreidus channeri*, Wood-Mason, P. A. S. B., August, 1885, p. 104, and J. A. S. B., Vol. LVI. 1887, pt. 2, p. 206, pl. i.

*Lyreidus gracilis*, Wood-Mason, J. A. S. B., Vol. LVI. 1887, pt. 2, p. 376.

The greatest breadth of the carapace—considerably in rear of the front—is a good deal more than half its greatest length, and is about  $2\frac{1}{2}$  times the width of the fronto-orbital border.

The rostrum consists of a simple flat acutely-triangular spine; on either side of it, projecting beyond it, separated from it by a deep bight, and parallel with its tip, is a long acicular spine forming the external orbital angle. The fronto-orbital region is hairy.

The gradually convergent antero-lateral borders are about two-fifths the length of the postero-lateral borders, the junction of the two borders being occupied by a long oblique acicular spine; and nearly midway between this spine and the spine at the external angle of the orbit on either side, is another similar but rather shorter spine. The postero-lateral borders are defined in more than their posterior half by a very fine raised line.

The surface of the carapace is finely and closely punctulate in all its anterior half, as are also the pterygostomial regions.

The eyestalks are broad and flat, and taper to the cornea, which has a somewhat lateral position and is a little deficient in pigment. The arms have a spine or two little spines near the middle of their dorsal surface: the wrist has a large spine in the distal half of its upper border: the hand has its outer (upper) edge carinate up to a subterminal denticle, and has its lower edge cut into two or three sharp teeth: the dactylus has its cutting edge faintly and irregularly sinuous, but by no means denticulate, and the opposed edge of the immobile finger is irregularly and rather bluntly jagged. The legs are almost free from hair, a few hairs occurring on the posterior edge of the propodite and dactylus of the third pair and on the last two joints of the rudimentary fourth pair only: in the first and third pairs the carpus is dorsally carinate and the propodite foliaceously expanded, in the first and second pairs the dactylus is little more than broadly palmulate, and in the third pair the dactylus is foliaceous. The third and fourth abdominal terga are armed each with a median recurved spine, in both sexes.

The largest female in the Indian Museum collection has the carapace 28.5 millim. long, a smaller ovigerous female has the carapace 26.5 millim. long.

Wood-Mason established his two species on two specimens, one of which—*L. channeri*—had suffered a good deal from breakage and imperfect re-growth about the frontal region.

A considerable series of the specimens since obtained shows that the two supposed species are really one.

In the Indian Museum collection are numerous specimens, from the Andaman Sea 220 to 271 fms., from the Bay of Bengal 200 to 405 fathoms, and from both sides of Ceylon 296 to 406 fms.

Uniform salmon-colour in life, white in spirit.



## EXPLANATION OF PLATES.

## PLATE VI.

- Fig. 1. *Calappa pustulosa*.  
„ 2. *Calappa woodmasoni*.  
„ 3. *Pseudophilyra woodmasoni*.  
„ 4. *Leucosia corallicola*.  
„ 5. *Leucosia sima*.  
„ 6. *Leucosia truncata*.  
„ 7. *Pseudophilyra blanfordi*.

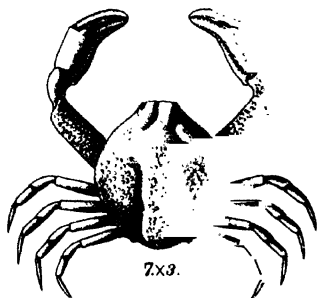
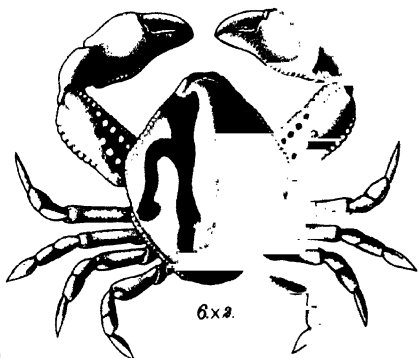
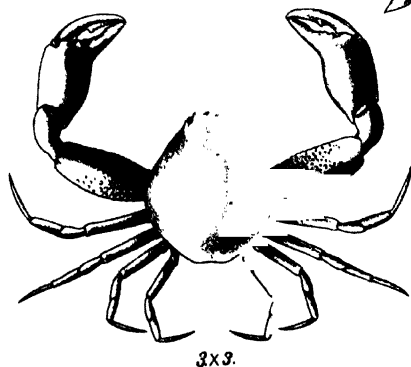
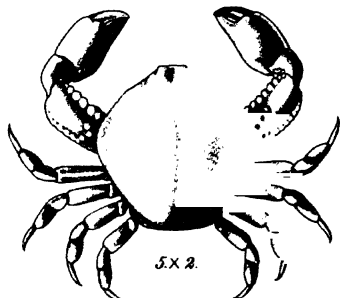
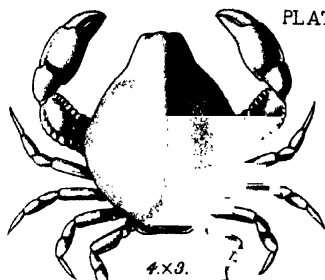
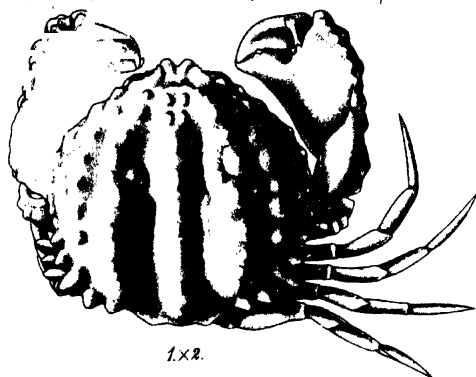
## PLATE VII.

- Fig. 1. *Philyra corallicola*.  
„ 2. *Philyra sexangula*.  
„ 3. *Ebalia woodmasoni*.  
„ 4. *Ebalia diadumena*.  
„ 5. *Nursia blanfordi*.  
„ 6. *Nursia nasuta*.  
„ 7. *Nursia persica*.

## PLATE VIII.

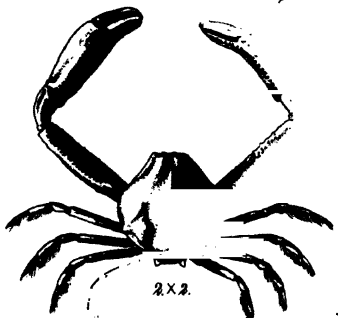
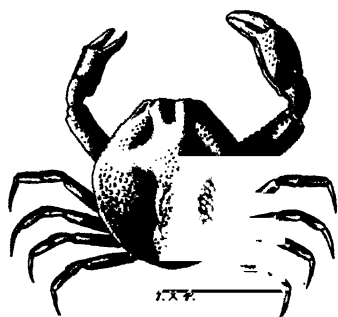
- Fig. 1. *Heteronucia vesiculosa*.  
„ 2. *Pariphiculus rostratus*.  
„ 3. *Actæomorpha morum*.  
„ 4. *Tlos patella*.





S. C. Mondul del. et. lith.

1. *Calappa pustulosa*, ♂. 2. *Calappa wood-masoni*, ♂. 3. *Pseudophilyra wood-masoni*, ♂.  
 4. *Leucosia corallicola*, ♂. 5. *Leucosia sina*, ♀. 6. *Leucosia truncata*, ♀.  
 7. *Pseudophilyra blanfordi*, ♂.



A.C.Chowdhary & S.C.Mondal del.

A.C.Chowdhary lith.

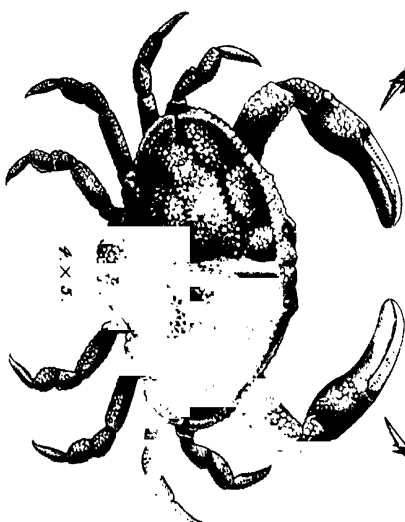
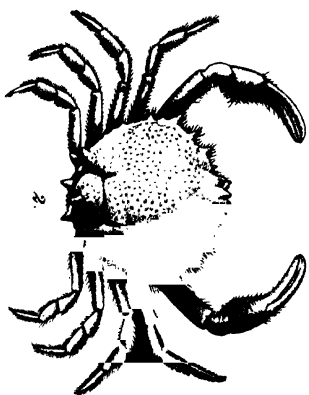
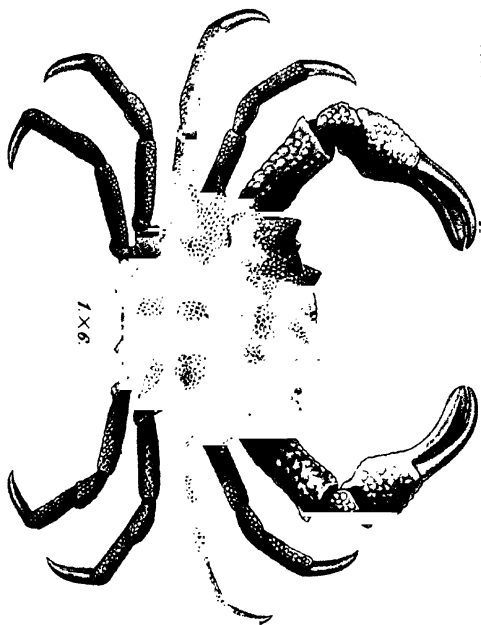
1. *Philyra ocellicola*, ♂. 2. *Philyra sexangula*, ♂. 3. *Ebalia wood-masoni*, ♂.

4. *Ebalia diadumena*, ♀.

5. *Nursia blanfordi*, ♀.

6. *Nursia nasuta*, ♂.

7. *Nursia persica*, ♀.



S. C. Mondul & A. C. Chowdhary del.  
1. *Heteronoma vesiculosa*, ♀. 2. *Pariphiulus rostratus*, ♀. 3. *Actaeomorpha morum*, ♀.



MATERIALS  
FOR A  
CARCINOLOGICAL FAUNA OF INDIA.

No. 3.

THE BRACHYURA CYCLOMETOPA.

PART I.

THE FAMILY XANTHIDÆ,

BY

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SUPERINTENDENT OF THE INDIAN MUSEUM.

*[Reprinted from the "Journal Asiatic Society of Bengal,"  
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1898.



*Materials for a Carcinological Fauna of India. No. 3. The Brachyura Cyclometopa. Part I. The Family Xanthidæ.—By A. ALCOCK, M.B., C.M.Z.S., Superintendent of the Indian Museum.*

[Received 20th March. Read 6th April, 1898.]

The family *Xanthidæ*, as here defined, includes the *Cancridæ* (without *Cancer* and *Pirimela*) and the *Eriphiidæ* (without *Oethra*) of Dana's system.

It is a family which, as most authors have remarked, it is almost impossible to divide into groups that shall be at once natural and sharply defined, owing to the numerous intergradations of form that exist.

The Indian species of this family, so far as I have been able to discover, number 153, of which all but the following 14 are represented in the Indian Museum :—

*Ourpilodes venosus* Edw., *Carpilodes margaritatus* A. M. Edw.,  
*Lachnopus rodgersi* Stimpson, *Lophactæa fissa* Henderson, *Lophozosymus*



*cristatus* A. M. Edw., *Hypocoelus rugosus* Henderson, *Cyclozanthus lineatus* A. M. Edw., *Halimede thurstoni* Henderson, *Cymo tuberculatus* Ortmann, *Pilumnus labyrinthicus* Miers, *Actumnus verrucosus* Henderson, *Actumnus nudus* A. M. Edw., *Heteropanope eucratoides* Stimpson, *Eurycarcinus maculatus* A. M. Edw.

The new species described in this paper have almost all been obtained by the "Investigator" and will be figured in the *Illustrations of the Zoology of the Investigator* for the year 1899, the original drawings for which are now in course of preparation.

### Tribe CYCLOMETOPA.

*Cyclometopes* Milne Edwards, Hist. Nat. Crust. I. 264, 363 (part.)

*Cancroidea*, Dana, U. S. Expl. Exp. Crust. pt. I. p. 142 (part.)

*Cyclometopes*, A. Milne Edwards, Ann. Sci. Nat., Zool., (4) XIV. 1860, p. 183.

*Cyclometopa* or *Cancroidea*, Miers, Challenger Brachyura, p. 106 (part.)

*Cancroides* Portuninea and *Cancroidea* *Cyclometopa* (part.) Ortmann, Zool. Jahrb., Syst., VII. 1893-94, pp. 65 and 411.

Carapace, almost without exception, broader than long, the antero-lateral borders generally arched, sometimes very strongly so, the postero-lateral borders generally convergent, sometimes very strongly so: the front broadish or broad, horizontal or obliquely deflexed, not rostrate.

Buccal cavern square-cut, commonly broader than long: the palp of the external maxillipeds articulating at or near the antero-internal angle of the merus.

Epistome transverse, short fore and aft.

The antennules generally fold nearly transversely.

The abdomen of the male occupies all the space between the last pair of legs.

Branchiæ nine pairs; their efferent channels opening on either side of the palate.

The genital ducts of the male open at the bases of the last pair of legs.

The *Cyclometopes* of Milne Edwards includes the genus *Æthra* which, following Miers, has been relegated to the *Oxyrhyncha* in this series of papers, and excludes the *Telphusidae*, which by all subsequent writers have been regarded as true *Cyclometopes*.

The *Cancroidea* of Dana includes the genus *Acanthocyclus*. My only knowledge of this genus is derived from drawings and descriptions, which do not as yet satisfy me that *Acanthocyclus* is more nearly related to the *Cyclometopes* than to other groups.

The *Cyclometopa* of Miers includes not only *Acanthocyclus*, but,

following Claus, the *Corystoidea*. Now undoubtedly several of the forms included under the *Corystoidea* have very close relations with *Cancer* and *Pirimela*; and if *Cancer* and *Pirimela* are regarded as typical Catamnetopes then such (*Corystoid*) forms as *Atelecyclus* and *Hypopeltarium* may also be classed as Cyclometopes.

In this preliminary paper I prefer not to take *Cancer* as an ideal Cyclometope, and to leave the *Corystoidea* for future consideration.

The *Oyclometopa* of Ortmann includes the family *Parthenopidæ*, which in this series of papers has, in accordance with the views of other authors, been considered with the *Oxyrhyncha*; and also the *Corystoid* genera *Atelecyclus* and *Hypopeltarium*, the Cancerine affinities of which have been admitted. I cannot, however, think that the removal of the *Parthenopidæ* from their long approved position, as *Oxyrhynchs* showing a connexion between that type and the Cancerine type, serves any useful purpose.

For the purposes of this paper the *Cyclometopa* are divided into the following families:—

I. *Canceridæ*, in which the fold of the antennules is longitudinal or obliquely longitudinal, and the anterior boundary of the buccal cavern is somewhat indefinite, being more or less overlapped by the external maxillipeds.

Of this family, of which *Cancer* and *Pirimela* are types, no representative is known in the Indian Seas.

II. *Xanthidæ*, in which the fold of the antennules is transverse or obliquely transverse, and the anterior boundary of the buccal cavern is raised and sharply defined, so that the external maxillipeds commonly shut close against it unless they fall short of it.

III. *Portunidæ*, in which the fifth pair of legs is peculiarly modified for swimming and usually has the propodite and dactylus singularly broad thin and paddle-like.

IV. *Telphusidæ*, in which the form is Grapsoid, the branchial regions being much dilated. The members of this family inhabit fresh water and, sometimes, damp jungle.

The present paper refers to the family *Xanthidæ*.

#### Family XANTHIDÆ.

*Canceriens* *arqués* et *quadrilatères* Milne Edwards, Hist. Nat. Crust. I. 369.

*Canceridæ* (exc. *Cancerinæ* et ?*Polydectinæ*) and *Eriphidæ* (exc. *Oethrinæ*) Dana, U. S. Expl. Exp., Crust., pt. I. pp. 147, 228.

*Canceriens* (exc. *Oethra*, *Cancérides* et *Pirimélides*) A. Milne Edwards, Nouv. Archiv. du Mus. I. 1863, pp. 177-182.

*Canceridæ* (exc. *Cancer*), Miers, Challenger Brachyura, p. 106.

*Xunthini* (exc. *Thiidæ*), Ortmann, Zool. Jahrb. Syst. VII. 1893-94, p. 412.

Carapace transversely oval or transversely hexagonal or subquadrate or (rarely) subcircular, but almost always broader than long. Front broadish or very broad, never in the form of a rostrum. The fold of the antennules is transverse or obliquely transverse. Antennary flagella short or slender. Anterior margin of buccal cavern very well defined, not overlapped by the external maxillipeds. Legs gressorial.

The *Xanthidæ* may be divided, according to the character of the palate emphasized by Dana, into two sections, as follows :—

I. *Hyperomerista*, in which the efferent branchial channel on either side is defined by a ridge on either side of the palate,—the ridge extending right up to the anterior border of the buccal cavern.

II. *Hyperolissa*, in which ridges defining the efferent branchial channels are either altogether absent or are present on the posterior part of the palate only.

I do not think that these sections, depending on a single variable character, should be considered as families, or even as subfamilies.

The section *Hyperolissa*, which corresponds to Dana's family Cancridæ, *minus* Cancer and Pirimela and Polydectus, is here subdivided into 3 subfamilies, hereafter characterized, namely, *Xanthinæ*, *Actæinæ*, and *Chlorodinæ*.

The section *Hyperomerista*, which corresponds to Dana's family Eriphiidæ, *minus* Oethra, is here subdivided into 4 subfamilies, hereafter characterized, namely, *Menippinæ*, *Oziinæ*, *Pilumninæ* and *Eriphiinæ*.

The genus *Platypilumnus*, Wood-Mason MS., Alcock, Ann. Mag. Nat. Hist. May 1894, p. 401, and Illustrations of the Zoology of the Investigator, Crustacea pl. xiv. fig. 6, probably belongs to this family and to the section *Hyperolissa*, and is probably related most nearly to *Galene*; but as I have only a single female specimen to go by its exact position must remain undecided.

The following artificial key is meant to serve for the discrimination of the Indian genera of this family :—

*Key to the Indian Genera of the Family Xanthidae.*

- I. The ridges that define the efferent branchial channels, if present, are low and are confined to the posterior part of the endostome, never reaching to the anterior boundary of the buccal cavern :—
  - i. The front and the antero-lateral borders together form a strongly convex arch ; the postero-lateral borders markedly, and often very strongly, convergent ; the posterior border, in consequence, short :—
    1. Fronto-orbital border hardly ever (in adults) more than half, most usually much less than half, the greatest width of the carapace :—

- A. Carapace convex both fore and aft and from side to side across the branchial regions :—
  - a. The abdomen of the male consists of seven distinct movable segments, the last of which is more than twice as long as the last but one :—
    - e. Front very narrow and prominent, shaped like a pair of human incisors : carapace smooth .....
    - γ. Front square-out, narrow, the two lobes not strongly convex dorsally : carapace rugose and granular ..
  - b. The abdomen of the male consists of five or six segments, owing to fusion of some, and the last is about the same length as the last but one :—
    - e. A deep notch in the anterior border of the merus of the external maxillipeds (abdomen of male with the 7 segments distinct, but the 3rd, 4th and 5th move together) .....
    - γ. No deep notch in the anterior border of the merus of the external maxillipeds :—

HYPOCORBULUS.

- g. A large oval or reniform cavity in either pterygostomian region...
  9. No cavity in the pterygostomian regions :—

1. Antero-lateral borders of carapace sharp, crest-like : upper border at least of arms, and of meropodites carpopodites and propodites of legs sharp and crest-like : basal antennal joint short, touching or clasping the turned down side-edge of the front ; chelipeds equal :—

- \* Crest of antero-lateral border entire or slightly notched ; carapace strongly convex in both directions ; fingers sharp pointed :—

- † Carapace perfectly smooth with the regions either not at all or only vaguely indicated...

- † Regions and subregions of carapace well sculptured, often granular .....

ATELEGATIS.

LOPHACTEIA.

POLYCREMUS.

HALIMEDA.

DAIRA.

- g. 1. (continued). [Antero-lateral borders sharp and crest-like : upper border of meropodites crest-like] :—  
 \* Crest of antero-lateral border cut into four sharpish lobes; carapace moderately convex, its regions much areolated; fingers blunt, hollowed out at tip ..... **ZOZYMUS.**
2. Antero-lateral borders not cristiform, cut into several strong teeth : either the upper and lower inner angles of the orbit are in contact, or the outer angle of the basal antennal joint is prolonged into and completely fills the orbital hiatus :—  
 \* Antero-lateral borders prolonged beneath the orbits to the angles of the buccal cavern; chelipeds short, hands light and narrow, fingers pointed ..... **EUKANTHUS.**  
 \* Antero-lateral borders normal; chelipeds long, hands very massive, fingers with broad hollowed-out (hoof-like) extremities ..... **ETISUS.**
3. Antero-lateral borders not cristiform; the basal antennal joint runs up between the side-edge of the front and the orbital plate, but not into the orbital hiatus; front never deeply cleft into two lobes :—  
 \* Antero-lateral borders entire up to a strong lateral epibranchial tooth; carapace perfectly smooth, without trace of regions; chelipeds unequal, fingers pointed; front three-lobed, the middle lobe prominent with a concave edge ..... **CARPILIUS.**  
 \* Antero-lateral borders divided into four broad, shallow, rounded lobes; regions and sub-regions of the carapace well demarcated; chelipeds equal, fingers somewhat hollowed at tip: front rather prominent, somewhat convex, grooved and slightly notched in the middle line ..... **CARPELODES.**
4. Antero-lateral borders not cristiform, divided into four broad, blunt, shallow lobes, of which the first two are almost confluent; basal antennal joint simply touching the front :—  
 \* Carapace nearly twice as broad as long. barrel-like; legs smooth ..... **LIOMERA.**

- \* Length of carapace much more than half its breadth; upper border of meropodites of legs spiny.....
- 6. Antero-lateral borders divided into four more or less distinct lobes; regions of carapace usually profusely areolated and granular; front usually deeply and rather broadly cleft into two pointed rounded lobes: fronto-orbital border sometimes more than half the greatest width of the carapace:—
  - \* Fingers of ordinary form .....
  - \* Fingers compressed and very sharp, like blades of shears .....
- B. Carapace more or less convex fore and aft, at any rate in its anterior two-thirds, flat from side to side across the branchial regions:—
  - a. Basal antennal joint prolonged into the orbital hiatus: carapace three-fourths as long as broad: fingers hollowed out at tip .....
  - b. Basal antennal joint simply touching the front:—
    - \* Carapace three-fourths as long as broad, its antero-lateral border very distinctly prolonged beneath the orbit to the angle of the buccal cavern .....
  - γ. Length of carapace usually less than three-fourths the breadth, the antero-lateral border not prolonged beneath the orbit to the angle of the buccal cavern:—
    - 2. Antero-lateral border thin sharp, almost crest-like, either divided into 4 large triangular teeth or quite crest-like and only faintly notched: fingers not hollowed at tip:—
      - \* Antero-lateral borders divided into 4 large triangular teeth: 3rd—5th abdominal terga of the male fused together with or without obliteration of sutures ..
      - \* Antero-lateral borders ending, in one or both sexes, in a strong horizontal lateral epibranchial spine: all 7 abdominal segments distinct ..
    - 3. Antero-lateral border not crest-like, divided into lobes or teeth which in some cases are indistinct—especially the first two of them:—
      - \* Fingers sharp-pointed, not hollowed at tip, antero-lateral border divided into 3 or 4 (usually 4) lobes or teeth:—

LACHNOPODUS.

ACTAEA, part.

BANAREIA.

ERISODES.

MEDÆUS.

LOPHOZOETYMUS.

HOPLOXANTHUS.

- \* Fingers sharp-pointed, not hollowed (*continued*.)
- † Regions and subregions of carapace well defined, the lobes or teeth of the antero-lateral border very distinct :—
- τ. Either the front is sublamellar square-out and prominent, or, if not, the carapace is smooth (non-granular) ..... XANTHO.
- β. Antero-lateral borders very long and strongly arched ..... CYCLOXANTHUS.
- φ. Front cleft into two round-pointed lobes, carapace granular ..... ACTAEA, *part*.
- † Regions, save the gastric, not well defined and areolated : the 3 or 4 lobes of the antero-lateral border inconspicuous or almost obsolete ..... LIOXANTHO.
- \* Fingers blunt-pointed, hollowed at tip, antero-lateral border divided into 4 or more teeth ..... LEPTODIUS.
- Fronto-orbital border much more than half the greatest width of the carapace :—
- A. Carapace roughly hexagonal :—
- a. Fingers pointed; basal antennal joint very short, just touching the front ..... XANTHODES.
- b. Fingers hollowed at tip, basal antennal joint of good length :—
- π. Basal antennal joint running up between the turned down side-edge of the front and the orbital plate, carapace not granular or hairy :—
- p. Regions and areolae of carapace few and faint or absent altogether ..... CHLORODIUS.
- q. Regions and areolae of carapace well sculptured ..... PHYMIDIUS.
- γ. Basal antennal joint prolonged into the orbital hiatus, regions and subregions of carapace well defined, granular or hairy, or both :—
- p. Carapace less than three-fourths as long as broad ..... CHLORODOPSIS.
- q. Carapace more than three-fourths as long as broad ..... CYCLODIUS.
- B. Carapace sub-circular or elongate-pentagonal, leaving 2 or 3 abdominal terga always uncovered : one oheiped enormously larger than the other ..... CYMO.
- ii. Carapace more approaching a quadrilateral shape (the arch of the antero-lateral borders being less convex and not longer than the postero-lateral borders, the convergence of the postero-lateral borders less marked, and the posterior border therefore longer), strongly convex fore and aft, flat from side to side : legs long :—
1. Carapace perfectly smooth, without trace of regions, antero-lateral borders entire ..... LIAGOSE.
2. Carapace more or less granular near the margins, regions defined though somewhat vaguely, antero-lateral border with lobes or teeth; basal antennal joint not reaching the front ..... GALENE.

3. Regions well defined, to some extent areolated; antero-lateral borders cut into four sharp teeth: carapace somewhat concave from side to side owing to swelling of the branchial regions above the level of the cardiac region. ....
11. The ridges that define the efferent branchial channels extend to the anterior boundary of the buccal cavern, and are often very strong:—
- i. Fronto-orbital borders half or less than half the greatest breadth of the carapace, which is broad and transversely-oval:—
1. The basal antennal joint does not nearly reach the front:—
- A. Carapace convex, the antero-lateral borders longer than the postero-lateral:—
- a. Front less than a fifth the greatest breadth of the carapace: orbital hiatus open .....
- b. Front nearly a fourth the greatest breadth of the carapace: no orbital hiatus, the orbit being a completely closed cavity .....
- B. Carapace nearly flat, the antero-lateral borders shorter than the postero-lateral .....
2. Basal antennal joint broadly in contact with the front:—
- A. Antero-lateral border not thin and sharp: dactylus of smaller hand shorter than the lower border of the palm:—
- a. Orbital hiatus open .....
- b. No orbital hiatus, the orbit being a completely closed cavity .....
- B. Antero-lateral border remarkably thin and sharp: dactylus of smaller hand as long as the entire lower border of the palm .....
- ii. Fronto-orbital border just about two-thirds the greatest breadth of the carapace: antero-lateral borders almost always shorter than the postero-lateral:—
1. The basal antennal joint does not reach, or only just reaches, the front: the orbital hiatus is not closed:—
- A. Carapace not tomentose, its regions ill defined, the first lobe of the antero-lateral border is a broad lobe confluent with the outer orbital angle:—
- a. Antero-lateral border cut into 4 teeth:—
- e. Indications of areolation on the carapace, anteriorly: front bilobed.....
- y. Carapace smooth, without any trace of areolae or regions; front cut straight and square (with a median emargination) .....
- b. Antero-lateral border cut into 3 teeth; branchial regions defined by a strong dorsal bulge; front cut straight and square .....
- B. Carapace with regions usually rather well defined and areolated: it and the legs usually, but not always, tomentose:—
- a. Carapace transversely oval, flattish or moderately convex, fairly well areolated... ..
- b. Carapace sub-circular with very concave postero-lateral borders, strongly convex, usually strongly areolated .....

ORPHNOXANTHUS.

MENIPPE.

MYOMENIPPE.

PSEUDOZIUS.

OZIUS.

EURUPPELLIA.

EPIKANTHUS.

HETEROPANOPE.

EURYCARCINUS.

NECTOPANOPE.

PILUNUS.

ACTUMNUS.



2. Basal antennal joint broadly in contact with the front: the orbit is a completely closed cavity: foliaceous process of the 1st maxillipeds with its notched anterior margin prominent beyond the anterior margin of the external maxillipeds ... ..
3. Fronto-orbital border much more than two-thirds the greatest breadth of the carapace: the antero-lateral borders meet the postero-lateral at a very wide and inconspicuous angle:—
1. Chelipeds longer and stouter than the legs:—
- A. Merns of external maxillipeds as long as or longer than broad:—
- a. Basal antennal joint as broad as long, hardly touching the front: little or nothing is seen of the arm beyond the lateral border of the carapace in repose: the gastric region plainly delimited and areolated ... ..
- b. Basal antennal joint slender, not or hardly touching the front: no trace of regions on the smooth polished carapace: at least half of the arm projects beyond the carapace:—
- a. Carapace flat, or little convex: no orbital hiatus:—
- p. Chelipeds not very greatly unequal; arm long,  $\frac{1}{2}$  visible beyond the carapace: front lobed or dentate ... ..
- q. Chelipeds very markedly unequal; arm short,  $\frac{1}{2}$  visible beyond the carapace: front nearly straight, finely denticulate ... ..
- r. Chelipeds subequal; arm very long, the whole of it projecting beyond the carapace: front acutely spinate ... ..
- y. Carapace convex: an orbital hiatus present: front broadly bilobed: the whole arm projecting beyond the carapace ... ..
- B. Merns of external maxillipeds about twice as broad as long ... ..
2. Chelipeds shorter and slenderer than the legs ... ..
- Appendix to Hyperoliinae?
- Endostomial ridges sharp and salient posteriorly, very inconspicuous anteriorly. Carapace hexagonal, very thin, and perfectly flat; the postero-lateral borders longer than the spinate antero-lateral borders, and only moderately convergent; the regions very faintly delimited. Legs long and slender. The basal antennal joint does not nearly reach the front ... ..

BARTOZIUS.

ERIPHA.

TRAPEZIA.

TETRALIA.

QUADRELLA.

SPHENOMERUS.

DOMEZIA.

MELIA.

PLATYPIDMUS

SECTION I. *Hyperolissa*.

*Xanthidæ* in which the efferent branchial channels are not defined by a complete ridge on either side of the palate.

## Subfamily I. XANTHINÆ.

Carapace usually much broader than long, usually transversely oval, sometimes transversely hexagonal. The front is contained from  $3\frac{1}{2}$  to  $5\frac{1}{2}$  times in the greatest breadth of the carapace.

Alliance I. CARPILIOIDA. Carapace broad, transversely oval, the antero-lateral border either entire, or divided into a few broad, shallow, rounded lobes. Legs sub-cylindrical. Abdomen of the male with the 3rd and 4th, or usually the 3rd, 4th and 5th segments fused together.

Alliance II. ZOZYMOIDA. Carapace broad, transversely oval, the antero-lateral border in the form of a sharp crest which may be either thin and entire (fissured only) or cut into 4 large teeth. Legs with at least the upper border of the merus carpus and propodus sharply cristiform. Abdomen of the male with the 3rd, 4th and 5th somites fused.

Alliance III. EUXANTHOIDA. Carapace broad, transversely oval, very profusely areolated in high relief; the antero-lateral borders are continued below the orbits to the outer angle of the buccal cavern. The basal antennal joint has its outer angle prolonged and impacted in the orbital hiatus, and the antennary flagellum, which is hardly visible without a lens, arises within the orbit. The abdomen of the male has the 3rd, 4th and 5th somites fused.

Alliance IV. XANTHOIDA. Front almost always prominent, square-cut (notched or fissured in the middle line) and sublaminar, and almost always separated from either supra-orbital margin by a deepish notch. Carapace broad (except *Medæus* and *Etisodes*), usually transversely oval, but sometimes more hexagonal; the antero-lateral border usually cut into sharp teeth. Male abdomen with segments 3-5 fused.

Alliance V. HALIMEDOIDA. Front prominent and square-cut. Carapace pentagonal, moderately broad. Abdomen of the male with all 7 segments distinct, the last segment being more than twice as long as any of the others.

Alliance VI. GALENOIDA. Carapace broad, pentagonal approaching the quadrilateral, the antero-lateral border hardly longer than the postero-lateral. The basal antennal joint does not nearly reach the front. The abdomen of the male has all 7 segments distinct. The sole type, *Galene*, is so singular that it might be separated as a distinct subfamily.

## Subfamily II. ACTAEINÆ.

Carapace usually much broader than long and usually very profusely and profoundly lobulated; the antero-lateral border is either divided into 4 blunt lobes, or crenated. The front is about a third the greatest breadth of the carapace, sometimes a little more, sometimes a little less, and is divided into two rather prominent usually round-pointed lobes.

## Subfamily III. CHLORODINÆ.

Carapace hexagonal or transversely oval, or subcircular (*Cymo*) or approaching the subcircular (*Cyclodius*). Front from a third to half the greatest breadth of the carapace—much broader than in the preceding subfamilies.

Alliance I. XANTHODEOIDA. Carapace transversely oval, front a third or little less than a third the greatest breadth of the carapace, fingers not hollowed at tip.

Alliance II. CHLORODIOIDA. Carapace transversely oval, front nearer half than a third the greatest breadth of the carapace, fingers hollowed at tip.

Alliance III. CYMOIDA. Carapace subcircular, flat; front about half the greatest breadth of the carapace: chelipeds remarkably unequal.

## Subfamily I. XANTHINÆ.

Alliance I. *Carpilioidea*.

Carpilius.

Liomera.

Liagore.

Carpilodes.

Lioxantho.

Lachnopus.

## CARPILIUS, Leach, Desmarest, A. M. Edw.

*Carpilius*, Leach, Desmarest Consid. Gen. Crust. p. 104 (footnote).

*Carpilius*, Rüppell, 24 Krabben roth. Meer. p. 13 (part).

*Carpilius*, Milne Edwards, Hist. Nat. Crust. I. 380.

*Carpilius*, De Haan, Faun. Japon. Crust. p. 16.

*Carpilius*, Dana, U. S. Expl. Exp. Crust. I. p. 159.

*Carpilius*, A. MILNE EDWARDS. ANN. SCI. NAT. ZOOL. (iv.) XVIII. 1862, p. 46, and NOUV. ARCHIV. DU MUS. I. 1865, p. 212, and Miss. Sci. Mex., Crust. p. 238.

*Carpilius*, Miers, Challenger Brachyura, p. 110.

Carapace broad, very convex in both directions, smooth (except for some coarse pitting inside the frontal and antero-lateral border), with no indication of regions; its antero-lateral borders strongly-arched, thick, entire, smoothly-moulded; its postero-lateral borders strongly-conver-

gent, straight, with a prominent tubercle at the angle of junction with the antero-lateral.

Front moderately broad, (less than a third the greatest width of carapace) deflexed, 3-lobed, the middle lobe prominent and bilobulate, the edges of all thickened.

Orbital margins entire, the upper margin thickened and forming a well-marked blunt tooth at its junction with the antero-lateral margin. Eyes on short thick stalks.

Antennules folding obliquely, almost transversely: inter-antennular septum broad.

Basal joint of antennæ long, flat, running up into an oblique cleft between the margin of the front and the infra-orbital plate; the antennary flagellum very small, less than half the diameter of the orbit and lodged in the said cleft.

Merus of the external maxillipeds with its anterior border very oblique.

Chelipeds massive, smooth, unequal in both sexes; the fingers bluntly pointed, those of the larger cheliped with a single pair of molariform teeth, those of the smaller cheliped with a blunt cutting-edge.

Legs smooth, sub-cylindrical.

Abdomen of male six-jointed—the 3rd and 4th somites fused with obliteration of sutures, the 5th somite also immovably adherent to the 4th. Large crabs.

### Key to the Indian species of *Carpilius*.

1. Carapace with definitely disposed large red blots ... *C. maculatus*.
2. Carapace irregularly marbled with red ... *C. convexus*.

#### 1. *Carpilius maculatus*, (Linn.)

*Cancer ruber*, Rumph, Amboinsche Rariteitkamer, p. 18, pl. x. fig. 1.

*Cancer sasatilis*, Seba, Thesaurus, III. 47, pl. xix. fig. 12.

*Cancer maculatus*, Linn. Syst. Nat. (xii.) p. 1042: Fabricius, Ent. Syst. II. 447, and Suppl. p. 338: Herbst, Krabben, I. ii. 135, pl. vi. fig. 41, and I. ii. 263, pl. xxi. fig. 118, and III. iv. 8, pl. lx. fig. 2: Desmarest, Consid. Gen. Crust. p. 104.

*Carpilius maculatus*, Milne Edwards, Hist. Nat. Crust. I. 382, and in Cuvier Règne Animal, Crust. pl. xi. fig. 2: De Haan, Faun. Japon., Crust. p. 7 (name only): Dana, U. S. Expl. Exp., Crust. pt. I. p. 160: Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 32: Alph. Milne Edwards, in Maillart's l'île Réunion, Annexe F, p. 3, and Nouv. Archiv. du Mus. 1. 1865, p. 214 and IX. 1873, p. 175: Heller, Reise Novara, Crust. p. 9: Hess, Archiv. fur Naturges. XXXI. i. 1865, pp. 133 and 171: Hoffmann, in Pollen and Van Dam, Faun. Madagasc., Crust. p. 3: Richters in Mobius Meeresf. Maurit. p. 145: F. Muller, Verh. Ges. Basel. VIII. 1886, p. 473: Miers, Challenger Brachyura, p. 111: de Man, Archiv. f. Naturges. LIII. 1887, i. p. 231, and Zool.

Jahrbuch., Syst. VIII. 1895, p. 496 : Cano, Boll. Soc. Nat. Napol. III. 1889, p. 189 : J. R. Henderson, Trans. Linn. Soc. Zool. (2) V. 1893, p. 353 : Ortmann, Zool. Jahrbuch., Syst. VII. 1894, p. 469.

Front obliquely deflexed, the median lobe very decidedly bilobulate and separated from the lateral lobes on either side by a deep notch.

Carapace with not less than eleven large roundish dark-red blots (which seem never to competely fade even in very old Museum specimens) disposed as follows :—two on either side immediately behind the eye, the smaller and anterior one of these involving the orbital margin ; three in a transverse curve across the middle of the carapace ; four in another transverse line just in front of the posterior margin.

Eight specimens, from the Andamans, Nicobars, and Palk Straits.

## 2. *Carpilius convexus*, (Forsk.) Rüppell.

*Cancer convexus*, Forskal, Descr. Anim. p. 88.

*Cancer adpersus*, Herbst, Krabben, I. ii. 264, pl. xxi. fig. 1.

*Cancer marmarinus*, Herbst, Krabben, III. iv. 7, pl. lx. fig. 1.

*Carpilius convexus*, Rüppell, 24 Krabben roth. Meer. p. 13, pl. iii. fig. 2 and pl. vi. fig. 6 : Milne Edwards, Hist. Nat. Crust. I. 382, pl. xvi. figs. 9, 10 : DeHaan, Faun. Japon. Crust. p. 17 (name only) : Dana, U. S. Expl. Exp. Crust. pt. I. p. 159, pl. vii. fig. 5 : Stimpson, Proc. Acad. Nat. Sci. Philad. 1858, p. 32 : Heller, SB. Ak. Wien XLIII. 1861, p. 319 : Alph. Milne Edwards in Maillard's l'île Réunion Annexe F. p. 3, and Nouv. Archiv. du Mus. I. 1865, p. 215, and IX. 1873, p. 176 : Hilgendorf in v. d. Decken's Reisen in Ost-Afrika III. i. p. 73 : Hoffmann in Pollen and Van Dam, Faun. Madagasc., Crust. p. 3 : Miers, P. Z. S. 1877, p. 133, and Ann. Mag. Nat. Hist. (5) II. 1878, p. 407 : Richters in Möbius Meeresfauna Maurit. p. 145 : E. Nauck, Zeitschr. Wiss. Zool. xxiv. 1880, p. 56 (gastric teeth) : Haswell, Cat. Austr. Crust. p. 41 : F. Muller, Verh. Ges. Basel VIII. 1886, p. 473 : de Man, Archiv. f. Naturges. liii. 1887, i. 232, and Zool. Jahrb. Syst. VIII. 1895, p. 496 : Ortmann Zool. Jahrbuch., Syst. etc., VII. 1894, p. 469, and in Semon's Zool. Forschungsr. (Jena. Denkschr. VIII.) Crust., p. 51 : Zehntner, Rev. Suisse Zool. II. 1894, p. 143.

*Carpilius lividus*, Gibbs, Proc. Amer. Ass. III. 1850, p. 174, is according to A. Milne Edwards, vide Nouv. Archiv. du Mus. I. 1865, p. 217, the young of *Carpilius convexus*. Miers also, Ann. Mag. Nat. Hist. (v) II. 1878, p. 407, considers *C. lividus* to be a synonym of *Carpilius convexus*.

Front vertically deflexed, the prominent median lobe is not decidedly bilobulate—in fact, it is sometimes but obscurely emarginate at tip—and is separated on either side from the lateral lobes by only a shallow excavation.

Carapace irregularly marbled with dark red, which in old spirit specimens sometimes fades entirely.

Seven specimens from the Andamans and Nicobars.

## CARPILODES, Dana, A. Milne Edwards.

*Carpilodes*, Dana, Silliman's Amer. Journ. Sci. and Arts, (2) XII. 1851, p. 126, and Proc. Acad. Nat. Sci. Philad. VI. 1852, p. 77, and U. S. Expl. Exp. Crust. pt. I. p. 192.

*Carpilodes*, Alph. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 224 (et synonym.)

*Carpilodes*, Miers, Challenger Brachyura, p. 133.

*Carpilozanthus*, Alph. Milne Edwards in Maillard's l'île Réunion, Annexe F, p. 3. (A. M. E.)

Carapace very broad, convex in both directions, with the regions generally well demarcated and—especially in the anterior half—subdivided into lobular areolæ; its antero-lateral borders usually subdivided into four broad, shallow, rounded lobes; its postero-lateral borders straight, or a little concave, and strongly convergent.

Front broad (about a third the greatest breadth of the carapace) obliquely deflexed, grooved and slightly notched in the middle line, but not distinctly bilobed.

Orbits small, with entire margins, but usually with the three suture lines near the outer angle more or less distinct: eye-stalks short and thick.

Antennules folding obliquely, almost transversely. Basal antennal joint running up between the front and the lower orbital plate much as in *Carpilius*; the flagellum rather longer than the major diameter of the orbit.

Anterior edge of merus of external maxillipeds almost transverse.

Chelipeds equal or subequal in both sexes: fingers pointed, but distinctly grooved or hollowed near the tips.

Abdomen of the male five-jointed, the 3rd–5th somites fused.

Small crabs, easily recognizable by their short broad convex carapace, with its antero-lateral margins in the form of four broad shallow rounded lobes, its postero-lateral margins strongly convergent, and the broad deflexed rather prominent and convex front.

*Key to the Indian species of Carpilodes.*

## I. Surface of carapace quite smooth to the naked eye:—

i. Upper border of meropodites of legs crest-like ... *C. lophopus*.

ii. Upper border of meropodites of legs not crest-like:—

## 1. Posterior part of carapace not lobulated:—

a. Gastric region subdivided into three lobules only ... *C. tristis*.

b. Gastric region subdivided into five lobules:—

a. Outer surface of wrist and hand smooth ... *C. venosus*.

β. Outer surface of wrist nodular, of hand granular... *C. simpsoni*.

3. The whole of the carapace divided into a network of lobules by fine lines ... *C. pediger*.

- II. Part or all of the surface of the carapace covered with vesiculous granules plainly visible to the naked eye :—
- i. Posterior part of the carapace not lobulated :—
    1. The whole of the carapace covered with granules ... .. *C. rugatus*.
    2. Only the antero-lateral part of the carapace granular ... .. *C. vaillantianus*.
  - ii. Posterior part of the carapace more or less divided into lobules by transverse grooves: the whole surface of the carapace densely granular :—
    1. A single transverse furrow behind the gastric region ... .. *C. margaritatus*.
    2. Two transverse furrows (exclusive of one that helps to form the raised posterior margin) behind the gastric region :—
      - a. Branchial lobules few, long, roll-like... *C. monticulosus*.
      - b. Branchial lobules many, small, nodule-like ... .. *C. cariosus*.

### 3. *Carpilodes tristis*, Dana.

*Carpilodes tristis*, Dana, U. S. Expl. Exp. Crust. pt. I., p. 193, pl. ix. figs. 7a-d : Heller, Novara Crust. p. 17 : Alph. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 225, and IX. 1873, p. 178 : Haswell, Cat. Austr. Crust. p. 56 : F. Muller, Verh. Ges. Basel, VIII. 1886, p. 474 : de Man, Notes Leyden Mus. XII. 1890, p. 50 : J. R. Henderson, Tr. Linn. Soc., Zool., (2) V. 1893, p. 353 : Ortmann, in Semon's Zool. Forschungsr. (Jena. Denkschr. VIII) Crust. p. 51.

Surface of carapace and appendages quite smooth to the naked eye, but with a dull look due to uniform microscopic miliary granulation. Gastric region delimited from the front, from the somewhat tumid supra-orbital margins, and posteriorly, by shallow grooves, and sharply demarcated from the branchial regions by fine sharp-cut lines; and subdivided into three lobules by a fine sharp-cut X shaped median incision.

Antero-lateral borders divided into four lobes, from the intervals between which fine sharp lines run obliquely inwards to incompletely subdivide the hepatic and branchial regions into lobules. Outer part of hepatic regions on a plane slightly lower than that of the rest of the carapace.

Colours in spirit: uniform dull brownish-buff, except the fingers and a large part of the lower border of the hand, which are black.

79 specimens from the Andamans and Nicobars.

### 4. *Carpilodes stimpsoni*, A. Milne Edwards.

*Carpilodes stimpsoni*, A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 232, pl. xi. figs. 2-2c, and IX. 1873, p. 181 : de Man, Archiv. fur Naturges. LIII. 1887, i. p. 294, and Journ. Linn. Soc., Zool., vol. XXII. 1887-88, p. 25.

Differs from *Carpilodes tristis* Dana in the following more conspicuous particulars:—

(1) the surface of the carapace is of a shiny smoothness, except for some irregular pitting on the lobules of the anterior portion:

(2) the gastric region is subdivided into five longitudinal lobules (as in all the following species) by incisions running almost parallel with the limbs of the  $\Lambda$  shaped median incision:

(3) the chelipeds have the upper and outer surface of the wrist nodular and of the hand granular, and the upper surface of the corresponding joints and merus of the legs nodular:

(4) the colour in spirit is light yellowish.

A single specimen from Mergui.

It appears to me very doubtful whether this species is really distinct from *C. venosus*.

#### 5. *Carpilodes venosus*, (Edw.)

*Carpilius venosus*, Milne Edwards, Hist. Nat. Crust. I. 383.

*Carpilodes venosus*, A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 227, pl. xii. figs. 2-2b, and IX. 1873, p. 179: Miers, Zool. H. M. S. "Alert," pp. 183 and 213: Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 353.

*Xantho obtusus*, De Haan, Faun. Japon. Crust., p. 47, pl. xiii. fig. 5: Krauss, Sudafr. Crust. p. 31.

Included in the Indian fauna on the authority of Dr. J. R. Henderson: there are no specimens in the Indian Museum referable to this species, unless (as, indeed, I believe) *C. stimpsoni* is synonymous.

From Milne Edwards' figures this species differs from *C. stimpsoni* in having the chelipeds and legs perfectly smooth.

#### 6. *Carpilodes pediger*, n. sp.

Allied to *C. venosus* and *stimpsoni*, from which it differs in having the whole of the carapace mapped out in lobules.

Most closely allied to *C. ruber* A. M. Edw., from which it conspicuously differs in the form of the male chelipeds.

Carapace extremely convex in both directions, its surface, like that of the appendages, being perfectly smooth to the naked eye though very finely granular under the lens: it is symmetrically and minutely subdivided by fine lines into very many little-convex and rather angular-outlined lobules. The antero-lateral borders are rather deeply four-lobed, the prominence of the outer angle of the orbit forming a small fifth lobule.

The chelipeds in the adult male are close upon twice the length of the carapace and have a very strong tooth on the inner upper border of



the wrist, and strongly-arched fingers which meet only at the tip, the movable finger bearing (in addition to the serrations of the hollow tip) a strong tooth near the base.

In the adult female the chelipeds are very little longer than the carapace and have only a small tooth on the wrist, and fingers which are not strongly arched but meet through the greater part of their extent.

Colours in spirit, light straw, fingers very light brownish: sometimes the wings of the carapace are light grey and then there is also a light grey stripe down the middle of the carapace, fore and aft.

Length of carapace 6.5 millim., breadth 10 millim.

Off Andaman Is. 10-41 fms., off Ceylon 26½ fms.

Seven specimens.

#### 7. *Carpilodes lophopus*, n. sp.

All parts are smooth to the naked eye, though under the lens the surface of the carapace and chelipeds is minutely pitted or eroded. The regions are demarcated and subdivided by very fine lines; and the lateral gastric areolæ (2 M of Dana) and the mid-branchial areolæ (4 and 5 L of Dana) are particularly, and rather angularly, convex.

The antero-lateral borders are four-lobed, the last two lobes being rather angular; the postero-lateral borders are markedly concave.

The front is broad and projects well beyond the orbits.

Chelipeds not very much longer than the carapace: two little tubercles, one above the other, at the inner angle of the wrist, and two at the distal end of the upper border of the hand.

The upper border of the meropodites of the legs is distinctly cristiform, that of the carpopodites is sinuous-cristiform, and both the upper and the lower edges of the propodites are cristiform—the lower more distinctly than the upper.

Colours in spirit, yellowish white.

Carapace about 5.5 millim. long, about 8.5 millim. broad.

Off south-east coast of Ceylon, 34 fms., a male and a female; a female from off Malabar coast, 29 fms.

#### 8. *Carpilodes rugatus*, (Latr.) A. Milne Edwards.

*Zoerymus rugatus*, Milne Edwards, Hist. Nat. Crust. I. 385, (A. M. E.)

*Zoerymus canaliculatus*, Lucas, Voy. Astrolabe, Crust. p. 21, pl. iii. fig. 2 (A. M. E.)

*Carpilosanthus rugatus*, A. Milne Edwards in Maillard's l'île Réunion, Annexe F, p. 3. (A. M. E.)

*Carpilodes rugatus*, A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 230, pl. xii. figs. 3, 3b, and IX. 1873, p. 180: Richters in Möbius Meeresf. Maurit. p. 146: Miers, Zool. H. M. S. "Alert," pp. 617 and 629.

Surface of carapace uniformly covered with granules which are visible to the naked eye and on the antero-lateral parts of the carapace are vesiculous: the upper and outer surfaces of the wrist and hand, and of the corresponding joints of the legs, are closely granular to the naked eye, the granules of the hand being arranged in longitudinal series.

As in all the Indian species of *Carpilodes* except *C. tristis*, the frontal and supra-orbital borders are cut off from the rest of the carapace by a sinuous groove which also includes the two front lobes of the four-lobed antero-lateral border, and the gastric region is longitudinally 5-lobular.

Transverse grooves running from the last two intervals between the lobes of the antero-lateral border cut off, respectively, (1) the hepatic from the branchial regions, and (2) the first branchial lobule from the rest of the branchial region. All the lobules are strongly convex.

The cardiac region is not defined, and there is no lobulation of the posterior moiety of the carapace.

Colours in spirit—pink, fingers purplish-brown with white tips.

3 specimens from the Cocos Islands (Andamans).

#### 9. *Carpilodes vaillantianus*, A. Milne Edwards.

*Carpilozanthus vaillantianus*, A. Milne Edwards, in Maillard's l'île Réunion Annexe F, p. 3. (A. M. E.)

*Carpilodes vaillantianus*, A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 231, pl. xi. figs. 3-3b. Haswell, Cat. Austral. Crust. p. 57: Miers, Zool. H. M. S. "Alert," p. 529: de Man, Archiv. f. Naturges. LIII. 1887, i. p. 235: Ortmann in Semon's Zool. Forschung. (Jenaische Denksch. VIII.), Crust. p. 51.

This species, if it is really distinct from *C. rugatus*, differs from the latter in the following particulars:—

(1) the granulation is confined to the antero-lateral parts of the carapace:

(2) the lobules of the carapace are less convex:

(3) the furrow that cuts off the anterior branchial lobule does not meet the furrow that bounds the gastric region.

Among 17 specimens in the Indian Museum there is a good deal of variation of these characters; so much so, that some of the specimens might almost be referred to *C. rugatus*, especially to the "Astrolabe" figure.

Five specimens from the Andamans, three from Muscat, two from Mergui; (the others from Mauritius, Samoa, and Viti).

#### 10. *Carpilodes margaritatus*, A. Milne Edwards.

*Carpilodes margaritatus*, A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, 320

p. 182, pl. v. fig. 2: Henderson, Trans. Linn. Soc. Zool. (2) V. 1893, p. 353: Whitelegge, Mem. Austral. Mus. III. 1897, p. 131.

Carapace and legs covered with pearly granules plainly visible to the naked eye. The carapace is much lobulate, the anterior branchial lobe being itself trilobulate, and the region behind the gastric region being crossed transversely by a furrow. The antero-lateral borders are indistinctly four-lobed. *The hands are not longitudinally furrowed.*

Colours; red, fingers black.

No specimens in the Indian Museum collection. Included here on the authority of Dr. J. R. Henderson.

#### 11. *Carpilodes cariosus*, n. sp.

Allied to *C. margaritatus*.

Carapace strongly convex, its whole surface intricately cut up, by deep grooves, into many small strongly-convex lobules, the surface of which is pitted and granular, so as to give the carapace as a whole a somewhat worm-eaten appearance.

The legs also have the extensor surfaces of the long joints granular and nodular: the outer surface of the wrist is nodular: the outer surface of the hand is granular and furrowed.

The antero-lateral borders are very distinctly four-lobed.

The space between the gastric region and the posterior border of the carapace is broken by two (or three, counting the groove inside the raised posterior border) deep transverse grooves, the space between the grooves being Cupid's-bow-shaped. A transverse groove also cuts off a narrow piece from the posterior extreme of the mesogastric lobule.

Colours in spirit; whitish with pink spots on carapace, legs pink, fingers sometimes black with white tips, sometimes pinkish white.

Length of carapace about 5 millim., breadth about 7 millim.

Off Ceylon  $26\frac{1}{2}$  to 34 fms., 13 specimens including several ovigerous females: off Andamans 10 to 15 fms., 2 specimens.

#### 12. *Carpilodes monticulosus*, A. Milne Edwards.

*Carpilodes monticulosus*, A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 181, pl. v. fig. 1: de Man, Archiv. f. Naturges. LIII. 1887, i. p. 233: Ortmann in Semon's Forschungsreisen (Jena. Denkschr. VIII.) Crust. p. 51.

Carapace very broad (not far short of twice as broad as long), its surface everywhere closely covered with elegant vesiculous granules. The whole of the carapace is divided, by deep broadish grooves, into elongate lobules of an elegant smooth roll-like form (quite unlike any other Indian species). A narrow beaded lobule forms the posterior limit of the mesogastric lobe (much as in *C. cariosus*), and two

furrows cross transversely the region between the latter and the posterior border of the carapace. On the branchial regions, on either side of the mesogastric lobule, is a small dimpled lobule. The wrist and hand are closely covered with granules like those on the carapace, the wrist being dimpled and the hand longitudinally furrowed.

The extensor surfaces of the legs are also closely, but much more finely, granular, the carpus in all being dimpled.

Antero-lateral borders four-lobed, the lobes narrow, rather shallow, rounded, and the last three of nearly equal size.

Colours in spirit; dark purplish-red, legs lighter, fingers white with brownish base.

Two specimens, from Gt. Coco I. (Andamans) and East I., Andamans are in the Indian Museum.

Carapace not quite 6 millim. long, 10 millim. broad.

#### LIOMERA, Dana.

*Liomera*, Dana Silliman's Amer. Journ. Sci. and Arts (2) XII. 1851, p. 124; Proc. Acad. Nat. Sci. Philad. 1852, p. 73; and U. S. Expl. Exp. Crust. pt. I. p. 160.

*Liomera*, A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 218, and Exp. Sci. Mex. Crust. p. 239.

Carapace extremely broad, strongly convex in both directions, transversely barrel-like, either smooth or with the regions very faintly indicated; its antero-lateral borders thick, either entire or divided into four broad shallow rounded lobes, of which the first two are almost coalescent; its postero-lateral borders very strongly convergent, straight or a little concave.

Front narrow (from a third to less than a fourth the breadth of the carapace), obliquely deflexed, grooved and slightly notched in the middle line, but not distinctly bilobed.

Orbits small, with the three suture lines near the outer angle usually distinct; eye-stalks short and thick.

The antennules fold nearly transversely. Basal antennal joint broad and short, merely touching the front; the flagellum, which is short, lodged in the orbital hiatus.

Anterior edge of merus of external maxillipeds a little oblique.

Chelipeds equal or subequal in both sexes; fingers somewhat hollowed at tip. Legs sub-cylindrical.

Abdomen of the male five-jointed, the 3rd—5th somites being fused.

Small or medium-sized crabs, easily recognized by their short, very broad, strongly convex, barrel-like carapace.

13. *Liomera cinctimana*, (White), Dana.

*Carpilius cinctimanus*, White, in Jukes Voyage H. M. S. "Fly," Vol. II. p. 336, pl. ii. fig. 3, and Samarang Crust. p. 37, pl. vii. fig. 4.

*Liomera cinctimana*, Dana, Silliman's Journ. (2) XII. 1851, p. 124, and U. S. Expl. Exp. Crust. pt. I. p. 161: A. Milne Edwards Nouv. Archiv. du Mus. I. 1865, p. 219, and IX. 1873, p. 176, pl. v. fig. 4, and Exp. Sci. Mex. Crust. p. 240: Stimpson, Ann. Lye. New York, X. 1874, p. 103.

*Carpilodes cinctimanus*, Miers, Ann. Mag. Nat. Hist. (5) V. 1880, p. 234: Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 354.

*Liomera lata*, Dana, Proc. Ac. Nat. Sci., Philad. 1852, p. 73, and U. S. Expl. Exp. Crust. pt. I. p. 161, pl. vii, figs 6a-d: Stimpson, Proc. Acad. Nat. Sci. Phil. 1858, p. 32, and Ann. Lye. New York, X. 1874, p. 104: Heller, Novara Crust. p. 9: A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 220, and Exp. Sci. Mex., Crust. p. 240: F. Muller, Verh. Ges. Basel. VIII. p. 474.

Carapace extremely broad—its length only about  $\frac{1}{3}$  of its breadth—its surface, like that of the appendages, everywhere smooth and polished, showing only the faintest indications of a gastro-cardiac region and of oblique lobulation of the branchial regions: the antero-lateral border is divided into three coarse lobes, the anterior of which is again obscurely divided into two.

Front obliquely deflexed, with a rather prominent convex edge cleft in the middle line. Orbital margin with three radiating suture-lines near the outer angle. Chelipeds equal.

Colours in spirit; orange-red, fingers black, hand with a broad black cross-band merging with the black of the immobile finger.

3 specimens from the Andamans and Muscat (besides specimens from Mauritius and South Sea Is.).

14. ? *Liomera sodalis*, n. sp.

Carapace broad (length about  $\frac{1}{2}$  breadth) very strongly convex, perfectly smooth, without any indication of regions, its margins smooth, entire. Front nearly vertically deflexed, its edge cleft in the middle line. Eyes large, supra-orbital margin without any suture-lines. Chelipeds a little unequal; the upper and outer surfaces of the carpus and hand of the smaller cheliped covered with prickly granules, but in the larger cheliped the granulation has a very much worn appearance: fingers hardly hollowed at tip.

Legs (those that are present in the unique specimen) somewhat hairy; none of the joints are carinate though some have prickly granules on the upper surface.

Colours in spirit—of the same blotchy orange and reddish colour as that of a species of *Solenocaulon*, in the hollow stem of which the crab was found.

Length of carapace 6 millim., breadth 9 millim.

Off south-east corner of Ceylon, 32 fms.

This species resembles a small *Atergatis*, but has sub-cylindrical legs and has no margin to the carapace.

### LACHNOPODUS, Stimpson.

*Lachnopus*, Stimpson, Proc. Ac. Nat. Sci. Phila. 1858, p. 32 : A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 233 : Ortmann, Zool. Jahrb. Syst. VII. 1893-94, p. 452.

"Carapax laevis, regione posticâ transversim convexâ. Orbita margine externâ trifissâ vel trilobatâ, lobis parvis, obtusis. Antennæ ut in *Carpilio* (ut in *Liomerâ* ?). Gnathopoda intima laciniâ ad apicem non furcatâ. Hectognathopoda ischio longitudinaliter sulcato; mero superficie versus angulum internum excavatâ, margine anteriore concavâ. Chelopoda manu facie externâ sulcatâ. Pedes ambulatorii valde setosi, mero compresso, superne spinoso.

"*Liomeræ* affinis, sed carapace angustiore, pedibus setosis spinosisque."

This genus is not represented in the Indian Museum.

### 15. *Lachnopus rodgersii*, Stimpson.

*Lachnopus rodgersii*, Stimpson, Proc. Ac. Nat. Sci. Phila. 1858, p. 32.

*Liomerâ rodgersii*, Miers, Ann. Mag. Nat. Hist. (5) V. 1880, p. 231, pl. xiii. fig. 3, (orbit and antennæ only): de Man, Archiv. für Naturges. LIIL. 1887, i. p. 237 : J. B. Henderson, Trans. Linn. Soc. Zool. (2) V. 1893, p. 354.

"Carapace transverse, about once and a half as broad as long, smooth, glabrous, and shining, with the interregional sutures almost obsolete; the two posterior teeth of the antero-lateral margins are the only ones developed, and are very obscurely marked and obtuse. The front is somewhat produced, and is divided by a median and two lateral incisions into four lobes, of which the two median are broad and truncated, and the lateral (or inner orbital lobes) are small and denticiform. On the upper orbital margin are three small obtuse teeth (including that of the outer orbital angle); the tooth at the inner and lower orbital angle is rather prominent. The merus-joint of the outer maxillipeds is rather small and transverse; and this joint has a shallow pit on its outer surface. The anterior legs (in the male) are robust, smooth; arm or merus-joint with a series of spinules on its upper margin; carpus smooth, with an antero-internal tooth; penulti-

mate joint or palm slightly rugose externally, and with two longitudinal and parallel grooves on its outer surface; fingers short, robust, toothed on their inner margins and with the apices not excavated. The ambulatory legs are somewhat compressed and clothed with long fulvous hairs; their merus-joints are spinulose on their upper margins. The postabdomen of the male is five-jointed, the third to fifth joints being coalescent. Length  $8\frac{1}{2}$  lines, breadth nearly 1 inch 1 line.

This species has been hitherto known only from the very short generic definition of Dr. Stimpson, which, however, embraces all the characteristic peculiarities of the species, and which agrees exactly with the example before me, except in one point. Stimpson says (l. c.), "Antennae ut in *Carpilio*." In the specimen now before me the antennae are of the same structure as in *Liomera*, the basal joint being very short and united at its summit to an inferior prolongation of the front, and not, as in *Carpilius*, joined to the front along its inner margin. I have little doubt that Stimpson erroneously wrote *Carpilius* for *Liomera*, as he does not say that *Lachnopus* is distinguished from *Liomera* by any peculiarity in the structure of the antennae.

I do not think that *Lachnopus* is generically distinct, as Milne Edwards has described a *Liomera* (*L. longimana*) with hairy ambulatory legs." (Miers.)

#### Genus LIOXANTHO.

Carapace broad, moderately or strongly convex in its anterior two-thirds, flat posteriorly; the gastric region is fairly or faintly delimited, and one or two short furrows may pass on to it obliquely from the intervals between the lobes of the antero-lateral margin, but beyond this there is no distinct division of the carapace into regions or sub-regions.

The antero-lateral borders are much like that of *Liomera*, being divided into 4 broad blunt lobes, of which the first two are so much coalescent as to really form but one.

Front somewhat deflexed, bilobed, or sinuous and notched in the middle line. Fronto-orbital border less than half the greatest width of the carapace.

Orbital margin and antennae as in *Xantho*.

Anterior edge of merus of external maxillipeds a little more oblique than in *Xantho*.

Chelipeds either subequal or unequal in both sexes, fingers pointed. Legs subcylindrical.

Abdomen of male five-jointed, the 3rd-5th somites coalescent.

Key to the species of the genus *Lioxantho*.

- I. Chelipeds unequal, outer angles of front separated from the supra-orbital margin by a notch; regional markings of carapace almost obsolete ... .. *L. tumidus*.
- II. Chelipeds equal, outer angles of front fused with supra-orbital margin:—
- i. Carapace chelipeds and legs smooth as wax ... .. *L. punctatus*.
- ii. Carapace chelipeds and legs uniformly closely and finely granular ... .. *L. asperatus*.

16. *Lioxantho punctatus*, (Edw.)

*Xantho punctatus*, Milne Edwards, Hist. Nat. Crust. I. 396: A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 199, pl. vii. fig. 6: Miers, Challenger Brachyura, p. 125: de Man, Zool. Jahrb. Syst. IV. 1889, p. 420, and Notes Leyden Mus. XII. 1890, p. 52, pl. iii. fig. 1.

*Liomera punctata*, Miers, Zool. H. M. S. Alert, pp. 517, 528: de Man, Archiv. fur Naturges. LIII. 1887, i. p. 238: J. R. Henderson, Trans. Linn. Soc. Zool., (2) V. 1893, p. 354: Ortmann, Zool. Jahrb., Syst. VII. 1893-94, p. 451.

Carapace moderately convex in the anterior two-thirds, flat posteriorly, its surface smooth. The gastric region is fairly well defined antero-laterally, and the fronto-orbital region marked off, by distinct grooves; and two short grooves (of which the anterior is the longer) pass in obliquely from the notches between the 2nd and 3rd, and 3rd and 4th lobes of the antero-lateral margin; but this is all the areolation that exists.

Antero-lateral border moulded into four broad shallow lobes, of which the first two are almost coalescent.

Front bilobed, the outer angle of each lobe fused with the supra-orbital border, as in *Xantho impressus* and as in no other Indian species of *Xantho*: the width of the front is about a fourth the greatest breadth of the carapace.

Chelipeds equal in both sexes, perfectly smooth, although a very indistinct groove sometimes runs about half way along the outer surface of the hand near the upper border.

Legs thickish, smooth, the dactylus with some fur and a few short hairs.

Colours in spirit; pinkish yellow or buff, with small red spots on carapace, and ill-defined pinkish-brown patches on chelipeds and legs; fingers black, with light brown tips.

In the Indian Museum are 3 specimens from Ceylon, (as well as 8 from Mauritius and 2 from Samoa).

17. *Lioxantho tumidus*, n. sp.

Carapace in its anterior two-thirds strongly convex from before



backwards and a little convex from side to side, flat in its posterior third; perfectly smooth and polished. The limits of the gastric region, and its division into three sub-regions, are faintly apparent as mere markings, not grooves; and the fronto-orbital region is marked off by a faint groove.

The antero-lateral border is divided into four broad shallow lobes, of which the first two are almost confluent; from the notch between the second and third a short groove runs obliquely inwards on to the carapace, and a still shorter one from the notch between the third and fourth.

Front much less than a fourth the greatest width of the carapace, bilobed, the outer angle of each lobe separated from the supra-orbital margin by a notch and groove.

Chelipeds unequal, smooth and polished.

Legs rather thick, smooth; a few scattered hairs along the upper border of the last three and along the lower border of the last two joints, the dactylus also furred. The upper border of the meropodites of all the legs, as well as of the arm, is microscopically serrulate or crenulate.

Colours in spirit pinkish yellow, fingers black with light brown tips.

In the Indian Museum are 3 specimens from the Andamans, (and one from Samoa).

This species exactly resembles a quite smooth and strongly-inflated *Xantho bidentatus*, and but that I have 4 specimens, representing both sexes and different ages, I should have regarded it as an abnormality of that species.

It also has a remarkable resemblance to the *Xantho* (*Lachnopus*) *tahitensis* figured and described by de Man in Zool. Jahrb. Syst. IV. 1889, p. 418, pl. ix. fig. 4; but it has not the row of strong spines along the upper border of the meropodites of the chelipeds and legs, that are characteristic of that species.

#### 18. *Liozantho asperatus*, n. sp.

Carapace very slightly convex fore and aft in its anterior two-thirds, quite flat posteriorly and from side to side, very closely sharply and uniformly granular everywhere except the posterior median portion, where the granulation is visible only under a lens. The gastric region is faintly delimited, a short bifurcating groove runs in from the frontal notch, and two very faint grooves run in obliquely from the two notches of the antero-lateral margins, but this is all the attempt at areolation that exists.

Antero-lateral border granular and rather sharp, very obscurely divided into three most inconspicuous lobes, the first of which hardly shows a trace of subdivision.

Front not quite a fourth the greatest breadth of the carapace, obliquely deflexed, emarginate and faintly grooved in the middle line, its outer angles not separated from the supra-orbital margin.

Chelipeds equal, the upper corner of the outer surface of the arm, the upper and outer surfaces of the wrists and hands, closely covered with little pearly granules like those on the antero-lateral parts of the carapace.

Legs stout: the upper edge of the merus and the dorsal surface of the next two joints granular like the chelipeds, the dactylus hairy.

Colours in spirit orange-yellow.

In the Indian Museum are a male and female probably from Karachi.

#### LIAGORE, De Haan.

*Liagore*, De Haan, Faun. Japon. Crust. p. 19.

*Liagora*, Dana, Amer. Jour. Sci. and Arts (2) XII. 1851, p. 124; and U. S. Expl. Exp. Crust. pt. I. p. 148.

Carapace somewhat approaching the quadrilateral, strongly convex fore-and-aft, little convex from side to side, smooth, without any indication of regions.

Antero-lateral border moderately arched, entire; postero-lateral border very moderately convergent, straight, about as long as the chord of the antero-lateral; posterior border long,—about half the greatest width of the carapace in length, or more.

Fronto-orbital border about half, front about quarter, the greatest width of the carapace in extent. Front a little deflexed, broadly bilobed. Orbital margin thin entire, the outer angle of orbit a little thickened. Eyes on very short thick stalks.

The antennules fold nearly transversely. Basal antennal joint very short and broad, but passing up between the side of the front and the inner angle of the orbit; the flagellum, which is about as long as the major diameter of the orbit, lodged in the orbital hiatus.

Anterior edge of merus of external maxillipeds somewhat oblique.

Chelipeds massive, equal in both sexes, the fingers pointed.

Legs subcylindrical, rather long, smooth.

Abdomen of male five-jointed, the 3rd-5th somites fused.

#### 19. *Liagore rubromaculata*, De Haan.

*Cancer (Liagore) rubromaculatus*, De Haan, Faun. Japon. Crust. p. 49, pl. v. fig. 1.

*Liagore rubromaculata* Miers, Ann. Mag. Nat. Hist. (5) II. 1878, p. 407 (note); and Challenger *Brachyura*, p. 111, (footnote).

Carapace transversely somewhat oval, approximating the quadrilateral type, with long posterior and only moderately convergent postero-lateral borders; its surface devoid of sculpture and perfectly smooth to the naked eye, microscopically pitted and granular: pterygostomian region somewhat hairy.

Antero-lateral border moderately sharp, entire. Front broadly and rather faintly bilobed, the outer angles of each lobe pronounced, prominent, and separated from the supra-orbital margin by a short shallow groove. A little pimple-like thickening at the outer angle of the orbit.

Chelipeds equal, smooth and polished: both borders of the arm hairy, the upper border with a few blunt denticles; both the inner and the outer angles of the wrist strongly pronounced; fingers long, pointed, with the opposed edges strongly but bluntly serrate.

Legs long, subcylindrical, smooth and polished, the dactyli most elegantly plumed.

Colours in spirit yellowish with numerous large livid red spots.

In the Indian Museum is a single specimen dredged off the Irrawaddy Delta in 20 fms., (besides 8 from Hongkong).

#### Alliance II. *Zozymoida*.

<i>Atergatis</i> .	<i>Lophactæa</i> .
	<i>Zozymus</i> .
	<i>Lophozozymus</i> .

#### ATERGATIS, De Haan, A. Milne Edw.

*Atergatis*, De Haan, Faun. Japon. Crust. p. 17.

*Atergatis*, Dana, Silliman's Journ. Sci. and Arts (2) XII. 1851, p. 124, and U. S. Expl. Exp. Crust. pl. I. p. 57.

*Atergatis*, A. MILNE EDWARDS, ANN. SCI. NAT. ZOOL. (4) XVIII. 1862, p. 49, and NOUV. ARCHIV. DU MUS. I. 1865, p. 231.

*Atergatis*, Miers, Challenger *Brachyura*, p. 111.

*Platypodia*, Bell, Trans. Zool. Soc. I. 1835, p. 336.

Carapace externally broad, convex in both directions, regional boundaries absent or quite inconspicuous, surface either quite smooth or somewhat pitted; its antero-lateral borders strongly arched and with an independent keel-like edge; the postero-lateral strongly convergent, straight. The under surface of the wings of the carapace is a good deal hollowed to receive the wrists and hands in flexion.

Front narrow (from a fourth to less than a fifth the greatest breadth of the carapace) more or less deflexed, its edge shaped like cupid's bow (i.e., not bilobed).

Orbital margin with the three suture-lines near the outer angle fine and faint but distinct: eyestalks short and thick, eyes small.

Antennules folding transversely, inter-antennular septum broad.

Basal joint of antennæ short, touching the front only at their antero-external angle; flagellum lodged in the orbital hiatus, short (less than the major diameter of the orbit).

Merus of external maxillipeds with the anterior border almost transverse.

Chelipeds subequal in both sexes; fingers pointed, not distinctly hollowed at tip.

Legs with the upper border of the merus carpus and propus, and the lower border of the merus and propus, sharply carinate or cristate.

Abdomen of the male five-jointed, the 3-5th somites being fused.

Medium-size and large crabs.

### Key to the Indian species of *Atergatis*.

- I. Edge of antero-lateral borders of carapace sharp and crest-like, forming a tooth or ridge at the lateral epibranchial angle :—
  - i. Carapace with an even surface, without indications of regions :—
    1. Surface of external maxillipeds almost devoid of hair; no comb-like tufts of hair on the legs ... .. *A. integerrimus*.
    2. Surface of external maxillipeds like a doormat; comb-like tufts of thick hair on the under surface of some of the joints of the legs ... .. *A. dilatatus*.
  - ii. Carapace with the surface somewhat lumpy; variegated with spots and confluent blotches ... *A. floridus*.
- II. Edge of antero-lateral borders of carapace thick and blunt; no ridge or tooth at the lateral epibranchial angle ... .. *A. roseus*.

### 20. *Atergatis integerrimus* (Lam.)

*Cancer integerrimus*, Lamarck, Hist. Nat. Anim. sans Vert. V. Crust. p. 272: Milne Edwards, Hist. Nat. Crust. I. 874 and in Cuvier's Règne An. Crust. pl. xi bis, fig. 1.

*Atergatis integerrimus*, De Haan, Faun. Japon. Crust. p. 45, pl. xiv. fig. 1: Dana U. S. Expl. Exp. Crust. pt. I. p. 158: Stimpson, Proc. Ac. Nat. Sci. Phila. 1858, p. 32: A. Milne Edwards, Nouv. Arch. du Mus. I. 1865, p. 235: Miers, Ann. Mag. Nat. Hist. (5) V. 1890, p. 231: Richters, in Möbius Meeresf. Maurit. p. 145: F. Muller, Verh. Ges. Basel, VIII. 1886, p. 474: de Man, Archiv. fur Naturges. LIII. 1887, i. p. 244, and Journ. Linn. Soc., Zool., XXII. 1888, p. 24, and Zool. Jahrbuch. Syst. VIII. 1895, p. 496: A. O. Walker, Journ. Linn. Soc., Zool., XX. 1890 p. 109:

J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 352: Ortmann, Zool. Jahrbuch Syst. VII. 1894, p. 462.

*Atergatis subdivisus*, White, Ann. Mag. Nat. Hist. (2) 1848, p. 284, and Samarang Crust. p. 38, pl. viii. fig. 8.

?*Atergatis subdentatus*, De Haan, Faun. Jap. Crust. p. 46, pl. iii. fig. 1: A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 236.

Carapace, length from about  $\frac{1}{4}$  to about  $\frac{1}{3}$  the breadth; its surface in the anterior third or half irregularly and rather distantly pitted, especially near the front and antero-lateral borders: except for two faint creases that partly show the cardiac region, there are no other traces of regional divisions.

The crest-like edge of the antero-lateral border turns in at the lateral epibranchial angle to form a stout ridge there: this edge sometimes shows traces of two or three fissures.

The front, which is little prominent, meets the antero-lateral borders at a wide but very distinct angle.

Orbits very small, their width being much less than a third the width of the front.

Surface of the external maxillipeds either quite smooth or with short and scanty hair. Sternum smooth to the naked eye, or with a little scattered pitting.

Chelipeds equal; the upper edge of the merus sharply, the upper edge of the hand and finger strongly but more bluntly, crested; the upper outer surface of the hand with some scale-like roughening.

The outer surface of the legs is hardly pitted; the claw, in all the legs, is hairy, and there is a little tuft of hair near the far end of the lower edge of the propodite, but all the other joints are generally free of hair.

Colours in spirits, pinkish ochre, fingers blackish brown, with whitish tip and teeth.

30 specimens from Mergui, the Andamans, Ceylon and Singapore.

## 21. *Atergatis dilatatus*, De Haan, A. Milne Edwards.

*Atergatis dilatatus*, De Haan, Faun. Jap. Crust. p. 46, pl. xiv. fig. 2: A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 238, and Nouv. Archiv. du Mus. IX. 1873, p. 183, pl. v. fig. 6: E. Nauck, Zeits. Wiss. Zool. XXXIV. 1880, p. 57, pl. i. figs. 19-21 (*gastric teeth*): F. Müller, Verh. Ges. Basel, VIII. 1886, p. 474: Henderson, Trans. Linn. Soc. Zool. (2) V. 1893, p. 353.

Closely resembles *A. integerrimus*, but easily recognized by the following constant differences:—

(1) the carapace is even broader, and has a sharper edge:

(2) the surface of the carapace is much more closely and extensively

pitted, no part being free from pitting except a small area in the mid-gastric region: the outer surface of the chelipeds and legs also is quite rough, from pitting:

(3) the creases that serve to show the cardiac region are much larger and deeper:

(4) the crest that bounds the endostome in front is higher:

(5) the external maxillipeds are closely covered, like a door-mat, with long thick bristles; and remarkable comb-like tufts of long stiff bristles are found along the front border of the ischium of the chelipeds and along the lower border of the ischium and merus of all the legs:

(6) the surface of the sternum is closely covered with confluent granules visible to the naked eye.

All these differences are to be noted in a large male with a carapace 119 millim. broad from Ceylon, in a medium-sized male (70 millim. broad) from the Andamans, and in two small females (59 and 44 millim. respectively) from widely different parts of the Andaman group — these four specimens being in the Indian Museum collection.

## 22. *Atergatis roseus* (Rüppell).

*Carpilius roseus* and *marginatus* Rüppell, 24 Krabben roth. Meer. p. 13, pl. iii. fig. 3 and pl. vi. fig. 7; p. 15, pl. iii. fig. 4.

*Cancer roseus* and *marginatus*, Milne Edwards Hist. Nat. Crust. I. 374, 375.

*Atergatis roseus* and *marginatus*, De Haan, Faun. Japon. Crust. p. 17 (names only):

*Atergatis roseus*, Heller SB. AK. Wien, XLIII. 1861, p. 309: A Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 239: Kossmann, Reise roth. Meer. Crust. p. 19: Richters in Möbius Meeresf. Maurit. p. 145: Haswell, Cat. Austr. Crust. p. 42: Cano, Boll. Soc. Nat. Nap. III. 1889, p. 189: Ortmann, Zool. Jahrb., Syst., VII. 1894, p. 461.

*Atergatis marginatus*, Krauss, Sudafr. Crust. p. 28: Dana U. S. Expl. Exp. Crust. pt. I. p. 158: A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 240.

*Atergatis laevigatus*, A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 241, pl. xv. figs. 4-4a: Henderson, Trans. Linn. Soc. Zool. (2) V. 1893, p. 352.

*Atergatis scrobiculatus*, Heller, Abhand. zool.-bot. Ges. Wien, XI. 1861, p. 5, and SB. AK. Wien, XLIII. 1861, p. 310: A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 242.

Carapace of much the same proportions as *A. integerrimus*, but with a perfectly smooth dull surface; no indication whatever of regions; the crest of the antero-lateral borders blunt and ending smoothly, without any ridge or tooth, at the lateral epibranchial angle.

Front, orbits, external maxillipeds and legs as in *A. integerrimus*. Fingers fluted, but upper edge of hand rounded, not crested.

Colours in spirit, brownish yellow, fingers blackish brown with whitish teeth and tips.

22 specimens from Karáchi, and Madras coast.

23. *Atergatis floridus*, (Rumph).

*Cancer floridus*, Rumph, Amboinsch. Rariteitk. p. 16, pl. viii. fig. 5: Linnæus, Syst. Nat. (xii) p. 1041.

*Cancer ocyroe*, Herbst, Krabben, III. ii. 20, pl. liv. fig. 2: Milne Edw. Hist. Nat. Crust. I. 375.

*Atergatis floridus*, De Haan, Faun. Jap. Crust., p. 46: Krauss, Sudafr. Crust. p. 27: Dana, U. S. Expl. Exp. Crust. pt. I. p. 159, pl. vii. fig. 4: Stimpson, Proc. Ac. Nat. Sci. Phila. 1858, p. 32: Heller, Novara Crust. p. 8: A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 243; and IX. 1873, p. 186: Targioni Tozzetti, Magenta Crust. p. 24: Miers, P. Z. S. 1877, p. 133, and Ann. Mag. Nat. Hist. (5) V. 1880, p. 231, and Zool. H. M. S. Alert, pp. 183, 207, and Challenger Brachyura, p. 112: Haswell, Cat. Austral. Crust. p. 41: F. Muller, Verh. Ges. Basel VIII. 1886, p. 474: de Man, Arch. fur Naturges. LIIL. 1887, i. 245, and Journ. Linn. Soc. Zool., XXII. 1888, p. 24, and Weber's Zool. Ergeb. Niederl. Ost.-Ind. II. 1892, p. 277: A. O. Walker, Journ. Linn. Soc., Zool., XX. 1890, p. 109: J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 352: Ortmann, Zool. Jahrb. Syst. VII. 1894, p. 460, and in Semon's Forschungen. (Jena. Denkschr. VIII) Crust. p. 51.

Carapace, length about  $\frac{7}{10}$  breadth; its surface of perfectly smooth texture, but rendered lumpy by broad shallow depressions that faintly define and subdivide the regions; the crest of the antero-lateral border is sharp and ends at a very distinct tubercle at the lateral epibranchial angle.

The front forms with the antero-lateral borders a semicircle. The orbits are rather large, their width being more than one-third that of the front.

External maxillipeds free from hair on the surface: the sternum and the surface of all parts of the appendages except the hands (which have some rough reticulations on the outer surface) are smooth.

Chelipeds equal, the upper edge of the merus and hand strongly and sharply carinate; the fingers fluted as usual. Legs with crested edges to the long joints, as in *A. integerrimus*.

Colours in spirit, yellow; carapace covered with symmetrically disposed brown spots and confluent blotches, chelipeds and legs with a few faint brown spots, fingers blackish with whitish teeth and tips.

86 specimens from the Andamans, Mergui, Ceylon, Laccadives and Karachi.

24. *Atergatis* sp.

There is, in the Indian Museum, a little specimen of an *Atergatis*, which may perhaps be the *A. asperimanus* insufficiently characterized by White in the P. Z. S. 1847, p. 224 and in the Annals and Magazine of Natural History, 1848, Vol. II. p. 285, as follows:—

“Carapace with its latero-anterior sides with a cutting edge, part 333.

"of carapace behind this punctate; the rest of the surface almost quite smooth with three or four impressed lines in front.

"Hands rugose, especially above; fingers, both movable and fixed, deeply channelled.

"Pale yellowish red; feet darker; fingers pale horn-coloured.

"Philippines."

Our little specimen, from off Ceylon, 34 fms., agrees with this description; but the "impressed lines," which define the gastro-cardiac region, are so faint as to be only just visible.

It has the crested legs of *Atergatis*.

#### LOPHACTÆA, A. Milne Edwards.

*Lophactæa*, A. Milne Edwards, Ann. Sci. Nat. Zool. (4) XVIII. 1862, p. 43; and Nouv. Archiv. du Mus. I. 1865, p. 245, and IX. 1873, p. 187.

*Lophactæa*, Miers, Challenger Brachyura, p. 113.

"The *Lophactæas* are distinguished from *Atergatis* by their narrower and always deeply lobulated carapace."

Carapace moderately broad, convex in both directions, with the regions generally well delimited and subdivided into lobes, and the surface generally (not always) granular; the antero-lateral borders have an independent crest-like edge, generally thin and sharp and distantly fissured; the postero-lateral borders are rather concave.

Front a little deflexed, about a fourth the greatest breadth of the carapace in extent, grooved and emarginate in the middle line, but not distinctly bilobed. Orbits large, the three suture lines near the outer angle distinct. Eyes on short thick stalks.

Antennules folding nearly transversely, inter-antennular septum broad. Basal joint of antennæ short, touching the front only; the flagellum lodged in the orbital hiatus. Merus of the external maxilliped with the front edge a little oblique.

Chelipeds equal in both sexes; fingers not hollowed at tip. Long joints of legs with sharp crest-like upper borders much as in *Atergatis*.

Abdomen of the male five-jointed, the 3rd-5th somites being fused.

Small crabs.

*Lophactæa*, except that the fingers are pointed instead of broad and hollowed-out at tip, appears to me to be as closely as possible related to *Zozymus*. In *Lophactæa*, besides the difference in the fingers, the carapace is more convex and less cut up into lobules, and its surface is generally granular.



Key to the Indian species of *Lophactæa*.

- I. Regions and sub-regions of the carapace very distinct ; postero-lateral borders slightly concave, but not definitely marked off from the rest of the carapace :—
  - i. Surface of carapace more or less covered with pearly granules :—
    1. Hand sharply crested along upper border :—
      - a. Pearly granules over the whole of the carapace, and over the outer surface of the carpus and propus of the walking legs ..... *L. cristata*.
      - b. Pearly granules absent from part of the post-cardiac region and from the walking legs ..... *L. semigranosa*.
    2. Upper border of hand not crested :—
      - a. Crest-like margin of antero-lateral border of carapace simply cleft ..... *L. granulosa*.
      - [b. Crest-like margin of carapace deeply eroded ..... *L. fissa*.]
  - ii. Surface of carapace and of appendages perfectly smooth ..... *L. anaglypta*.
- II. Regions and sub-regions of the carapace so faint as to be visible only on close inspection ; postero-lateral borders remarkably concave, and defined by a row of sharp beads or teeth ..... *L. corallina*.

25. *Lophactæa cristata*, A. Milne Edwards.

*Lophactæa cristata*, A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 246, pl. xvi. fig. 1 : de Man, Notes Leyden Mus. III. 1881, p. 95, and Arch. fur Naturges. LIII. 1887. i. p. 246 : F. Müller, Verh. Ges. Basel VIII. p. 474 : Ortmann, Semon's Forschunger. (Jena. Denkschr. VIII.), Crustacea, p. 60.

Carapace symmetrically intersected by broad smooth rather deep furrows, which delimit and subdivide the regions, the strongly marked convexities of the regions and subregions being closely studded with pearl-like granules : similar, but larger, granules occur in linear series on the outer surface of the wrist and hand ; and similar, but smaller, granules are found on the outer surface of the corresponding segments of the legs. The under surface of the carapace is finely granular and more or less furred.

The whole supra-orbital border is tumid, with a row of pearly granules.

The crest of the antero-lateral border is divided into four broad segments by three narrow fissures.

Upper border of the arm and hand strongly and sharply crested, fingers fluted.

Legs with a few scattered bristles on most of the joints, and with the claws covered with short fur: the upper edge of the merus carpus and propus is strongly crested, as are the lower edges of the merus.

Colours in spirit, yellowish or greenish brown, fingers blackish brown.

One specimen from the Madras coast is in the Indian Museum collection. (There are other specimens from Mauritius).

26. *Lophactæa semigranosa*, (Heller) A. M. Edw.

*Atergatis semigranosus*, Heller, Abhand. zool.-bot. Ges. Wien, XI. 1861, p. 6, and SB. AK. Wien, XLIII. 1861, p. 313.

*Lophactæa semigranosa*, A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 248: Miers, Zool. H. M. S. Alert, pp. 517 and 527: de Man, Archiv. fur Naturges. LIII. 1887, i. p. 246, pl. viii. fig. 4: J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 355: Ortmann, Zool. Jahrb. Syst. VII. 1894, p. 459.

Closely resembles *L. cristata* Heller, from which it is, perhaps, not specifically distinct. It differs chiefly in having the pearly granules not only less sharply sculptured and less closely studded, but quite absent from a part of the post-cardiac region, from the supra-orbital border, and from the outer surface of the walking legs. Its appearance, in short, is that of *L. cristata* with the sculpturing worn.

7 specimens from the Andamans, Mergui, and Ceylon.

27. *Lophactæa granulosa*, Rüppell, A. M. Edw.

*Xantho granulatus*, Rüppell, 24 Krabben roth. Meer. p. 24, pl. v. fig. 3.

*Aegle granulatus*, De Haan. Faun. Japon. Crust. p. 17 (name only).

*Cancer limbatus*, Edw., Hist. Nat. Crust. I. 377, pl. xvi. fig. 14.

*Atergatis limbatus*, Dana, U. S. Expl. Exp. Crust. pt. I. p. 157: Heller, Novara Crust, p. 8: Streets, Bull. U. S. Nat. Mus. VII. 1877, p. 105.

*Lophactæa granulosa*, A. MILNE EDWARDS, NOUV. ARCHIV. DU MUS. I. 1865, p. 247, and IX. 1873, p. 187: Brocchi, Ann. Sci. Nat. (6) II. 1875. Art. 2, p. 71, pl. xvii. fig. 138 (male appendages): Hilgendorf, MB. AK. Berl. 1878, p. 787: de Man, Notes Leyden Mus. III. 1881, p. 95, and Archiv. fur Naturges. LIII. 1887, i. p. 246: Haswell, Cat. Austr. Crust. p. 43: Miers, Challenger Brachyura, p. 114: Cano, Boll. Soc. Nat. Nap. III. 1889, p. 190: J. R. Henderson, Tr. Linn. Soc., Zool., (2) V. 1893, p. 354: Ortmann, Zool. Jahrb. Syst. &c. VII. 1894, p. 459.

Closely resembles the two preceding species, from which it differs most conspicuously in having no crest to the upper border of the hand: the granulation of the carapace is not nearly so sharp-cut and pearl-like. In the Indian Museum are specimens from Australia and Samoa, but none from India. It is included in the Indian Fauna on the authority of Dr. J. R. Henderson.

28. *Lophactæa anaglypta* (Heller), A. M. Edw.

*Atergatis anaglyptus*, Heller, Abhandl. zool.-bot. Ges. Wien, 1861, p. 6, and SB. Ak. Wien, XLIII. 1861, p. 312, pl. ii. figs. 11, 12.

*Lophactæa anaglypta*, A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 251, and IX. 1873, p. 190: Ortmann, Zool. Jahrb. Syst. VII. 1893, p. 459: de Man, Zool. Jahrb. Syst. VIII. 1895, p. 498.

Carapace with the regions separated and symmetrically subdivided by broad but well cut grooves, but with the texture of the surface—as of the appendages—perfectly smooth, the only roughness of any sort being a few lines and impressions on the outer surface of the hand.

Crest of the antero-lateral border narrow, divided into four lobes by three insignificant notches or dents. Supra-orbital border not tumid throughout its extent. Crest of the upper border of the hand low and rather blunt: crests of the leg-joints distinct but rather low.

One specimen from Galle, one from the Persiau Gulf.

29. *Lophactæa corallina*, n. sp.

Carapace broadly semioval, with remarkably concave postero-lateral borders, the crest of the antero-lateral border very thin and sharp and a little angular, the postero-lateral and posterior borders bounded by a line of sharp beads or teeth. Front obliquely deflexed, with a sharp broadly-bilobed edge.

The whole surface of the carapace is very finely granular, but the division and subdivision of the regions, though undoubtedly existent, is hardly perceptible, so faint are the inter-regional depressions: some long stiff hairs occur here and there.

The under surface of the carapace and the surface of the external maxillipeds and male sternum is finely granular.

The chelipeds and legs are rather hairy and are beautifully sculptured: at the distal end of the arm is a petal-like crest, and three series of larger petaloid granules or crests traverse the outer surface of the wrist longitudinally: the outer surface of the hand is closely granular, the granules becoming linear in arrangement and laminar in form towards the upper part.

The outer surfaces of the legs are covered with granules and teeth, two crests on the carpopodites of all being very distinct.

Colours in spirit, yellowish or whitish with a pink blush: fingers with a black cross-band at the base.

Length of carapace 6 millim., breadth 9 millim.

A male and female from off Ceylon, 34 fms.

30. *Lophactæa fissa*, Henderson.

*Lophactæa fissa*, Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 355, pl. xxxvi. figs. 8, 8a.

It appears to me possible that this, which seems to be founded on a single specimen, is only an individual variation of *L. granulosa*.

*Lophactæa* sp.

From Inglis I. (Andamans) a single small specimen, not agreeing with any described species, which in the circumstances I forbear to describe.

It belongs to the *L. cristata* and *semigranosa* group, but has the inter-regional furrows much shallower and less distinct, and the pearly granules absent from all but the front part of the gastric region and the lateral parts of the epibranchial region: those on the chelipeds are also much fewer and more scattered. The legs are very hairy.

## ZOZYMUS, Leach.

*Zozymus*, Leach, [Dict. Sci. Nat. XII. p. 75. Miers]: and in Desmarest, Consid. Gen. Crust. p. 105.

*Zozymus*, Milne Edwards, Hist. Nat. Crust. I. 383 (part).

*Zozymus*, Dana, U. S. Expl. Exp., Crust. pt. I. p. 189.

*Zozymus*, A. Milne Edwards, Ann. Sci. Nat., Zool., (4) XX. 1863, p. 302.

*Zozymus*, Miers, Challenger Brachyura, p. 134.

Carapace moderately broad, moderately convex in both directions, with the regions well delimited and subdivided into numerous lobules, the surface of which is not usually granular.

The antero-lateral borders are sharp and crest-like, and are cut into lobes (usually four in number); the postero-lateral borders are straight and strongly convergent.

Front about a fourth the greatest breadth of the carapace, obliquely deflexed, grooved and emarginate in the middle line: orbits large, the tumid edge with the three suture lines near the outer angle distinct; eyes on short thick stalks.

Antennules folding nearly transversely, inter-antennular septum broad. Basal joint of antennæ short, touching the front only at the (produced) antero-internal angle; the flagellum short (less than the major diameter of the orbit), lodged in the orbital hiatus.

Merus of the external maxillipeds with the front edge a little oblique.

Chelipeds equal in both sexes; fingers with broad hollowed-out

tips. Long joints of legs with sharp crest-like upper borders much as in *Atergatis*.

Abdomen of the male five-jointed, the 3rd-5th somites being fused. Rather large crabs.

### Key to the Indian species of *Zozymus*.

- I. All parts of carapace rugose : inter-regional and inter-lobular furrows smooth and naked except, perhaps, near the margin of the carapace ... *Z. aeneus*.
- II. Posterior third of carapace hardly at all rugose : inter-regional and inter-lobular furrows for the most part full of short close hair ... *Z. pilosus*.

### 31. *Zozymus aeneus*, (Linn.)

*Cancer incomparibilis*, Seba, Thesaurus III. 48, pl. xix. fig. 18.

*Cancer aeneus*, Linn., Mus. Lud. Ulr. p. 451, and Syst. Nat. (ed. xii) p. 1048.

*Cancer floridus*, Herbst, Krabben, I. ii. 132, 264, pl. iii. fig. 39, pl. xxi. fig. 120.

*Cancer amphitrite*, Herbst, Krabben, III. ii. 5, pl. liii. fig. 1.

*Cancer aeneus* and *floridus*, Fabricius, Ent. Syst. II. 455, 445, and Suppl. p. 335, 338.

*Cancer aeneus*, Latreille, Hist. Nat. Crust. V. 375 : Lamarck, Hist. Nat. Anim. sans Vertéb. V. 271 : Desmarest, Consid. Gen. Crust. p. 104 : [Quoy et Gaimard, Voy. Uranie, pl. lxxvi. fig. 1. Edw.].

*Zozymus aeneus*, Milne Edwards, Hist. Nat. Crust. I. 385.

*Aegle aeneus*, De Haan, Fann. Japon. Crust. p. 17.

*Zozymus aeneus*, Dana, U. S. Expl. Exp. Crust. pt. I. p. 192, pl. x. fig. 3 : Stimpson, Proc. Ac. Nat. Sci. Phila. 1858, p. 32 : Heller, SB. AK. Wien, XLIII. 1861, p. 326 : A. Milne Edwards, in Maillard's l'île Réunion, Annexe F. p. 4, and Nouv. Archiv. du Mus. IX. 1873, p. 207 : Miers, Ann. Mag. Nat. Hist. (5) II. 1878, p. 407, and Phil. Trans. Vol. 168, 1879, p. 498, and Ann. Mag. Nat. Hist. (5) V. 1880, p. 234, and Challenger Brachyura, p. 134 : Richters in Möbius Meeresf. Maurit. p. 146 : Haswell, Cat. Austral. Crust. p. 58 : F. Muller, Verh. Ges. Basel VIII. p. 474 : de Man, Archiv. fur Naturges. LIII. 1887, i. p. 273 : Cano, Boll. Soc. Nat. Napoli III. 1889, p. 199 : J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 359 : Ortmann, Zool. Jahrb. Syst. VII. 1893-94, p. 458, and Semon's Forschungen. (Jena. Denk. VIII) Crust. p. 50 : Whitelegge, Mem. Austral. Mus. III. 1897, p. 131.

Carapace with the regions well delimited and very strongly rugose, the rugosities being small in the postero-lateral regions but everywhere smooth and polished, and everywhere symmetrical. The crest-like antero-lateral borders are 4-scalloped, the three anterior lobes being rounded and the fourth being dentiform.

The tumid orbital margins are marked by four suture lines. The front hardly projects beyond the level of the orbit.

The wrist has its outer surface made rugose by meandering furrows, one of which runs fore and aft, the others transversely. The

hand carries a blunt but well-marked crest along its upper border, below which the surface is rugose much as the wrist: the lower part of the outer surface of the hand is tuberculous, the tubercles tending to a linear arrangement. The fingers are fluted, bear strong molariform teeth and tufts of hair on their cutting edge, and have blunt-pointed, hollowed out (spoon-like) tips. The furrows of the wrist and hands, as well as those of the legs, are filled with close short fur.

The merus carpus and propus have the upper edge strongly carinate, the inner surface of each crest bearing a thick fringe of long somewhat silky hair: the dorsal surface of these joints is furrowed longitudinally, with many more or less plain transverse impressions also: the dactyli are hairy up to the claw.

In life the animal is beautifully spotted and ocellated with chocolate brown on a bluish-grey ground. In spirit the animal has a chinaware look and a dull yellowish-white colour, with darker yellow and dull brownish spots and markings.

In the Indian Museum are 30 specimens from the Andamans and Laccadives.

### 32. *Zozymus pilosus*, A. Milne Edwards.

*Zozymus pilosus*, A. Milne Edwards, Ann. Soc. Ent. France (4) VII. 1867, p. 271; and Nouv. Archiv. du Mus. IX. 1873, p. 203, pl. vii. fig. 2.

Carapace having the regions and lobules well defined in its anterior two-thirds only: the lobules have a flattened semi-imbricate look, wavy edges, and a rough or granular surface; and the grooves that separate them are filled with small short close-set bristles, especially along the anterior contours of the lobules.

All four lobes of the antero-lateral borders are rounded and not dentiform. The orbital margin is not very tumid and is marked by three suture lines. The front projects beyond the orbit.

The wrist and band are closely nodular: the nodules (those on the hand especially) have a granular surface, and the grooves that separate them are full of short close hair: the upper edge of the hand is not crested. Fingers short, stout, blunt-pointed, hollowed at tip: they are strongly fluted, the ridges being beaded in their basal half.

The legs have the upper edge of the merus, carpus, and propodite strongly crested: the crest of the merus and carpus may be sub serrate, and is always notched near the distal end. The dorsal surface of the carpus and propodite is grooved and nodular—the nodules having a flat, subimbricate look.

Colours in spirit—yellowish-white, with a faint bluish or purplish bluish; the crest-like margin of the carapace lighter than other parts; fingers dark brown with white tips.

In the Indian Museum is a specimen from Port Blair Harbour (Andamans), and one from the Angrias Bank (Malabar Coast) in 15 fms.

Although the chelipeds and antero-lateral margins make this species easily recognizable from *Lophozozymus incisus* (Edw.) de Man, I am inclined to suspect that this is the young of *L. incisus*.

### LOPHOZOZYMUS, A. Milne Edwards.

*Lophozozymus*, A. Milne Edwards, Ann. Sci. Nat., Zool., (4) XX. 1863, p. 276; and Ann. Soc. Entom. France (4) VII. 1867, p. 272.

*Lophozozymus*, Miers, Challenger Brachyura, p. 114.

Differs from *Zozymus* in having (1) the crest of the antero-lateral border sharp-edged and (2) the fingers not spooned at tip. To avoid unnecessary disturbance of accepted nomenclature the name is here maintained as a subgenus of *Zozymus*.

#### Key to the Indian species of the subgenus *Lophozozymus*.

- I. Front lobe of the antero-lateral border confluent and fused with the orbit : [size moderate or small]:—
  - Regions and lobules of carapace well defined ; the lobules pitted or dented, the grooves between them hairy : chelipeds and legs shaggy ... .. *L. incisus*.
  - i. Regions and lobules of carapace ill defined and faint ; surface of carapace smooth and bare : legs with a few lank scattered hairs ... .. *L. dodone*.
- II. Front lobe of antero-lateral border separated from the orbit by a gap ; carapace smooth, the regions (but not the subregions) fairly well defined : [size large]:—
  - i. Hands smooth and bare ... .. *L. octodentatus*.
  - ii. Outer surface of hand granular and hairy ... .. *L. cristatus*.

### 33. *Lophozozymus octodentatus*, Edw.

*Cancer saxatilis*, Rumph. Amboinsch. Rariteitk. p. 9, pl. v. fig. M.

*Cancer rumphii*, Guérin, Icon. Règne An. pl. ii. fig. 1, (nec Herbat.)

*Xantho octodentatus*, Milne Edwards, Hist. Nat. Crust. 1. 398 : Lucas in Jaquinot's Voyage Astrolabe, Zool., Crust., p. 23, pl. ix. fig. 1 : E. Nauck, Zeits. Zool. XXXIV. 1880, p. 61 (gastric teeth) : Haswell, Cat. Austral. Crust. p. 58.

*Lophozozymus epheliticus* Linn., Miers, Ann. Mag. Nat. Hist. (5) V. 1880, p. 231, and Zool. H. M. S. Alert, pp. 182. 207 : A. O. Walker, Journ. Linn. Soc., Zool., XX. 1890, p. 109 : de Man, Zool. Jahrb., Syst., VIII. 1895, p. 518.

Carapace perfectly smooth and polished ; the gastric region delimited on all sides and partly subdivided, and the hepatic separated from the branchial regions, by broad smooth shallow depressions. Underside of carapace hairy.

Front gently convex beyond the orbits, finely cleft in the middle line. Orbital border sharp, somewhat puckered by three sutures near the outer angle. The crest-like antero-lateral border is sharp and is cut into four teeth, of which the first is separated from the orbit by a gap, the third and fourth are keeled, and the third strongly acuminate.

Chelipeds equal, their surface perfectly smooth: the upper edge of the arm is strongly crested, the crest at its distal end being foliaceously expanded and deeply cleft; wrist with a strong double tubercle at its inner angle; upper edge of hand crested, but rather coarsely; fingers large, long, pointed.

Legs smooth: upper edge of merus carpus and propodite strongly crested, the inner face of the crest with tufts of long hair; dactylus furred up to the claw.

Colours in spirit: a bright orange-red network on a dull yellow-ochre ground, fingers black.

In the Indian Museum are two specimens from Singapore.

#### 34. *Lophozozymus cristatus*, A. Milne Edwards.

*Lophozozymus cristatus*, A. Milne Edwards, Ann. Soc. Entom. France (4) VII. 1867, p. 272, and Nouv. Archiv. du Mus. IX. 1873, p. 203, pl. vi. fig. 4: J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 361: Ortmann, Zool. Jahrb., Syst., VII. 1893-94, p. 456.

This species appears to differ from *L. octodentatus* only in having the first lobe or tooth of the antero-lateral margin acute instead of rounded and the outer surface of the hands granular and hairy.

There are no specimens in the Indian Museum; and the species—if it be distinct—is included in the Indian fauna on the authority of Dr. J. R. Henderson.

#### 35. *Lophozozymus incisus* (Edw.) Haswell, de Man.

*Xantho incisus*, Milne Edwards, Hist. Nat. Crust. I. 397: Hess, Archiv. f. Nat. XXXI. 1865, i. p. 133: F. Muller, Verh. Ges. Basel, VIII. 1886, p. 474.

? *Xantho superbus*, Dana, Proc. Ac. Nat. Sci. Philad. 1852, p. 74, and U. S. Expl. Exp. Crust. pt. I. p. 167, pl. viii. figs. 5a-b, (nec A. Milne Edwards) de Man.

*Lophozozymus incisus*, Haswell, Cat. Austral. Crust. p. 58: de Man, Archiv. für Naturges. LIII. 1887, i. p. 263, pl. x. fig. 1: Thallwitz, Abh. u. Ber. Mus. Dresden, 1890-91, no. 3, p. 48.

Carapace with the regions well delimited, and having the branchial regions (and to a less extent, the gastric region also) subdivided into lobules which have their anterior margins sinuous and sharply undetermined so as to have a semi-imbricate look. The surface of these lobules is a little dented and uneven, and the grooves that separate them are full of hair.



The crest-like antero-lateral border is cut into 4 lobes, of which the first is confluent with the orbit, and the last two are pointed and strongly keeled. Front little convex beyond the orbits, distinctly bilobed. Orbital border sharp, salient, with three suture-lines.

Chelipeds equal: upper edge of arm with a strong crest, which is foliaceously expanded and cleft at its distal end; upper border of hand and dactylus crested; outer surface of wrist and hand covered with large granules, which stand in more or less distinct linear series and are a good deal concealed by long shaggy hairs. Fingers stout, of good length, pointed.

Legs with the upper edge of merus carpus and propodite strongly crested and shaggy, and the surfaces of the dactylus and of most of the propodite shaggy.

Colours in spirit yellow with many orange-red patches; fingers dark brown.

In the Indian Museum are 2 specimens, one from the Orissa Coast, 15-35 fms., the other from the Angrias Bank (Malabar Sea) 15 fms.

### 36. *Lophozozymus dodone* (Herbst) Hilgendorf, de Man.

*Cancer dodone*, Herbst, Krabben, III. ii. 37, pl. lii. fig. 5.

*Lophozozymus dodone*, Hilgendorf, MB. Ak. Berl. 1878, p. 789; Miers, Zool. H. M. S. Alert, pp. 517, 527: de Man, Archiv. für Naturges. LIII. 1887, i. p. 270, pl. x. figs. 2, 2a: J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 361: Ortmann, Zool. Jahrb., Syst., VII. 1893-94, p. 457.

*Xantho radiatus* (? *C. dodone* Herbst) Milne Edwards, Hist. Nat. Crust. I. 398: A. Milne Edwards, in Maillard's l'île Réunion, Annexe F. p. 4.

*Atergatis lateralis*, White P. Z. S. 1847, p. 225; Ann. Mag. Nat. Hist. (2) II. 1848, p. 285; and Samarang Crust. p. 89, pl. viii. fig. 1.

*Xantho lamelligera*, White, ll. cc. p. 225, p. 285, p. 40 (fide A. Milne Edwards *infra*).

*Xantho nitidus*, Dana, Proc. Ac. Nat. Sci. Phila. 1852, p. 74, and U. S. Expl. Exp. Crust. pt. I. p. 166, pl. viii. figs. 4a-b.

*Atergatis elegans*, Heller, Novara Crust. p. 7, pl. i. fig. 4 (fide de Man).

*Lophozozymus radiatus*, A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 206.

Carapace smooth with the regions very faintly indicated and with very few and faint traces of lobulation: sometimes a few lank hairs on the antero-lateral border.

The crest-like antero-lateral border is trenchant and somewhat cockled, and is cut into 4 shallow scallops, the last two of which are acuminate and carinate, and the first of which is confluent with the orbit. Front slightly convex beyond the orbits and a little emarginate in the middle line. Orbital border sharp with the suture lines faint and indistinct.

Chelipeds equal; outer surface of wrist and hand finely granular or rugose under the lens; upper edge of arm crested but not foliaceously expanded; both upper and lower edge of hand crested. Fingers very short and stumpy, pointed.

Legs smooth: upper edge of merus carpus and propodite crested and having a few scattered hairs; also a few scattered hairs on the surface and lower edge of propodites.

Colours in spirit yellow, with diffused orange-red patches; fingers brown, white at tip.

In the Indian Museum are three specimens from the Andamans.

### Alliance III. *Euzanthoida*.

*Euzanthus*.      *Hypocoelus*.

#### *EUXANTHUS*, Dana.

*Euzanthus*, Dana, Silliman's Amer. Journ. Sci. and Art. (2) XII. 1851, p. 125; Proc. Ac. Nat. Sci. Phila. 1852, p. 75; and U. S. Expl. Exp. Crust. pt. I. p. 173.

*Melissa*, Strahl, Archiv. für Naturges. XXVII. 1861, i. p. 101.

*Euzanthus*, A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 289.

Carapace very broad, strongly convex in both directions, with the regions well delimited and subdivided into convex lobules.

The antero-lateral borders are sharp and somewhat irregularly scalloped, the lobes often subpyramidal or dentiform: they do not terminate at the orbit, but are prolonged, beneath the orbit, to the buccal cavern. The postero-lateral borders are very short and very concave.

The front is of no great breadth (about a fifth the greatest breadth of the carapace), bilobed, and prominent. The supra-orbital border and the inner angle of the lower border of the orbit are tumid, and the rest of the orbital margin is very low and forms an unbroken curve, with only one closed suture line. The eyes have short thick stalks.

The antennules fold nearly transversely. The basal antennal joint is prolonged right into the orbit, and the short flagellum is therefore placed inside the orbit. The outer border of the merus of the external maxillipeds is oblique.

The chelipeds are equal in both sexes, and are relatively small and light. The fingers are rather long-pointed, and have the tip slightly but distinctly hollowed out.

Abdomen of the male five-jointed, the 3rd-5th somites being fused.

Crabs of medium size, easily recognized by the peculiar form of the basal joint of the antennæ and the course of the antero-lateral margin of the carapace.

Key to the Indian species of *Euxanthus*.

1. Lobules of carapace almost smooth; outer angle of orbit not marked by a denticle ..... *E. melissa*.
2. Lobules of carapace rough; outer angle of orbit marked by a denticle ..... *E. sculptilis*.

37. *Euxanthus melissa*, (Herbst).

*Cancer exsculptus*, Herbst, Krabben, I. ii. 265, pl. xxi. fig. 121.

*Cancer melissa*, Herbst, Krabben, III. ii. 7, pl. li. fig. 1.

*Euxanthus melissa*, Stimpson, Proc. Ac. Nat. Sci. Phila. 1858, p. 33: A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 293: Targioni Tozzetti, Magenta Crust. p. 27, pl. iii. figs. 1-7: F. Muller, Verh. Ges. Basel, VIII. p. 474: J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 359: Ortmann, Zool. Jahrb. Syst. VII. 1893-94, p. 466, pl. xvii. fig. 9.

*Cancer mamillatus*, Milne Edwards, Hist. Nat. Crust. I. 376.

*Melissa mamillata*, Strahl, Archiv. für Naturges. XXVII. 1861, i. p. 103.

*Euxanthus mamillatus*, A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 292; pl. xv. figs. 2-2b; and IX. 1873, p. 196: Haswell, Cat. Austral. Crust. p. 48: de Man, Journ. Linn. Soc., Zool., XXI. 1887-88, p. 30.

*Euxanthus nitidus*, Dana, Proc. Ac. Nat. Sci. Phila. 1852, p. 75; U. S. Expl. Exp., Crust. pt. I. p. 174, pl. viii. figs. 9a-b. (young).

*Melissa nitida*, Strahl, Archiv. für Naturges. XXVII. 1861, i. p. 103.

*Cancer exsculptus*, Hoffmann in Pollen and Van Dam, Faun. Madagasc. Crust. p. 38.

? *Euxanthus exsculptus* var. *rugosus*, Miers, Zool. H. M. S. Alert, pp. 517, 527 (? young.)

The lobules of the carapace are extremely convex, and though some of them may be a little dimpled, especially in the young, they are commonly smooth.

The antero-lateral borders are cut into five teeth, but there is often a tubercle—which may be incompletely double—between the 4th and 5th teeth; between the 3rd and 5th teeth the margin is finely granular.

The curve of the orbit is unbroken by any denticle at the outer angle, and is smooth, not granular.

The outer surfaces of the wrist and hand, as of the corresponding joints of the legs, are nodular, the nodules and the hollows between them being smooth: on the lower outer surface of the hand are two longitudinal wrinkles which also have a smooth surface. The fingers have their surfaces smooth, and their cutting edges strongly toothed, with the tip distinctly hollowed out.

Colours of good spirit specimens: stone grey or yellowish, with numerous tiny chocolate-brown or purplish specks, and some large blotches of the same colour on the gastric, hepatic and branchial regions. These markings have faded in spirit specimens that have been preserved

over ten years. Fingers blackish brown, this colouration extending along the lower border and inner surface of hand.

In the Indian Museum are 17 specimens from the Andamans, Mergui, and Ceylon (besides a specimen from Samoa).

### 38. *Euzanthus sculptilis*, Dana.

*Euzanthus sculptilis*, Dana, Proc. Ac. Nat. Sci. Philad. 1852. p. 75, and U. S. Expl. Exp. Crust. pt. I. p. 173, pl. viii. figs. 8a-d : A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 291 : Ortmann, Zool. Jahrbuch., Syst., VII., 1893-94, p. 466.

*Cancer huonii*, Lucas in Jacquinot's Voy. Astrolabe, Crust. p. 16, pl. iv. fig. 1.

*Euzanthus huonii*, A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 290, pl. xv. figs. 1-1c : Haswell, Cat. Austral. Crust. p. 47 : Miers, Zool. H. M. S. Alert, pp. 182, 204 : de Man, Archiv. für Naturges. LIII. 1887, i. p. 268.

Lobules of carapace moderately convex, their surface so much wrinkled and dented transversely as to give them an almost scaly look.

Antero-lateral borders cut into six teeth, the edge between all the teeth being granular.

The orbital margin is granular, and there is a denticle to mark the outer angle of the orbit,

The nodules of the wrists and hands—and, to a less strongly marked extent, those of the corresponding joints of the legs—are granular, as are the hollows between the nodules; and the two wrinkles along the lower outer surface of the hand are granular. The fingers resemble those of *E. melissa*, except that their surfaces are strongly granular.

Colours of well-preserved spirit specimens: yellowish with purplish spots and blotches, many of which are confluent; fingers and hand coloured as in *E. melissa*.

In the Indian Museum are 3 specimens from Persian Gulf and Andamans, (besides one from Samoa).

### HYPOCÆLUS, Heller.

*Hypocælus*, Heller, Abh. zool-bot. Ges. Wien, 1861, p. 7; and SB. AK. Wien, XLIII. 1861, p. 319.

*Hypocælus*, A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865. p. 295.

Differs from *Euzanthus* chiefly in having a large oval or reniform cavity excavated in either pterygostomial region.

It is not represented in the Indian Museum.

### 39. *Hypocælus rugosus*, Henderson.

*Hypocælus rugosus*, Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 358, pl. xxxvi. figs. 9-11.

Alliance IV. *Xanthoida*.

Xantho.	Etisus.	Orphinoxanthus.
Leptodius.	Etisodes.	
Medæus.		
Cycloxanthus.		
Hoploxanthus.		

## XANTHO, Leach.

*Xantho*, Leach, Malac. Pod. Britt. pl. xi and text, 1815; and Trans. Linn. Soc. XI. 1815, p. 320.

*Xantho*, Desmarest, Consid. Gen. Crust., p. 104.

*Xantho*, (part) and *Eudora* (part), De Haan, Faun. Japon. Crust. pp. 18 and 22.

*Xantho*, (part) Milne Edwards, Hist. Nat. Crust. I. p. 387.

*Xantho*, (part) Dana, U. S. Expl., Exp., Crust. pt. I. p. 166.

*Xantho*, A. Milne Edwards, Ann. Sci. Nat., Zool., (4) XX. 1863, pp. 275 and 294 and Mus. Sci. Mex., Crust. p. 251.

*Xantho*, Miers, Challenger Brachyura, p. 124.

## [Type XANTHO FLORIDUS, Leach.]

Carapace broad, moderately convex anteriorly, flat in the posterior half; the regions generally well delimited and fairly well lobulated in the anterior two-thirds, but not posteriorly.

Antero-lateral borders arched, usually cut into four teeth or lobes: postero-lateral borders moderately convergent, not concave.

Extent of fronto-orbital border half, or less than half, the greatest width of the carapace: front about a fourth the greatest breadth of the carapace.

Front little deflexed, rather prominent, usually sublaminar, notched in the middle line, usually separated from the supra-orbital margin by a notch or groove.

Orbital margin with two (often indistinct) suture lines above and one (more distinct) just below the outer angle: usually a prominent tooth at the inner angle of the lower edge of the orbit. Eyes on short thick stalks.

Basal antennal joint short, meeting the front at the inner angle: the flagellum, which is about as long as the orbit, lodged in the orbital hiatus.

Anterior edge of merus of external maxillipeds nearly transverse, with commonly a small tooth near the antero-internal angle.

Chelipeds either unequal in both sexes, or less commonly equal in both sexes (*Xantho impressus*, *Xantho scaberrimus*); fingers pointed.

Legs subcylindrical, with the upper edges often sharp (crested in *Xantho scaberrimus*.)

Abdomen of male five-jointed, the 3rd-5th somites fused; (in *X. impressus* the sutures are so distinct that the abdomen may appear 7-jointed).

*Key to the Indian species of the Genus Xantho.*

- I. Chelipeds equal, or almost equal, in both sexes:—
  - i. *Legs crested*, the crest sharp, or serrate, or crenate: length of carapace a good deal more than two-thirds the greatest breadth: lobules of carapace covered with convex subequamiform tubercles ..... *Xantho (Lophomanthus) scaberrimus*.
  - ii. Legs thick, sub-cylindrical, length of carapace less than two-thirds the greatest breadth: lobules of carapace smooth ..... *Xantho (Eudora) impressus*.
- II. Chelipeds unequal in both sexes: length of carapace two-thirds, or a little more than two-thirds, the greatest breadth: the 'legs may have sharp, but never distinctly crested edges:—
  - i. First two teeth of the antero-lateral margin faint, obsolescent; carapace and chelipeds smooth (non-granular)..... *Xantho bidentatus*.
  - ii. Either the last three, or all four, teeth of the antero-lateral margin distinct; a large part of the carapace and of the exposed surfaces of the chelipeds wrinkled and granular ..... *Xantho distinguendus*.

40. *Xantho distinguendus*, De Haan.

*Cancer (Xantho) distinguendus*, De Haan, Faun. Japon. Crust. p. 48, pl. xiii. fig. 7: Heller, SB. Ak. Wien, XLIII. 1861, p. 323.

*Chlorodius distinguendus*, Stimpson, Proc. Ac. Nat. Sci. Phila., 1868, p. 34.

*Xantho macgillivrayi*, Miers, Zool. H. M. S. Alert, pp. 183, 211, pl. xx. fig. c.

*Lophosorasmus (Lophosanthus) bellus*, var. *leucomanus*, Miers, Challenger Brachynra, p. 116, pl. xi. fig. 1.

*Medeus distinguendus*, de Man, Journ. Linn. Soc., Zool., XXII. 1887-88, p. 31: J. R. Henderson, Trans. Linn. Soc., (2) V. 1893, p. 359.

Regions of carapace well delimited, fairly well divided into lobules: the anterior and lateral parts of the carapace are covered with granular transverse wrinkles which have almost a scaly look.

Front cleft into two rather prominent, square-cut, sub-laminar lobes. Antero-lateral margin cut into four sharply granular teeth, which may be all sharply acuminate, or the first may sometimes be rather indistinct.

The under surface of the carapace, below and external to the orbit is, like the first lobe of the antero-lateral margin, eroded and granular.

Chelipeds unequal in both sexes: upper part of the outer surface of arm with some fine transverse granular wrinkles; upper and outer surface of wrist and hand closely granular, the wrist and the upper part of the hand being also eroded or pitted, most usually in a peculiar honey-comb fashion; fingers stout, fluted.

Legs rather thin: upper edge of merus sharp (almost subcristiform), often finely granular: carpus and propodite usually grooved and ridged longitudinally (the propodite most distinctly so, and on both surfaces): dactylus covered with close short fur. The sculpture of the carpus and propodite, as of the chelipeds, is variable, even in specimens from the same locality.

Abdomen of male 5-jointed, the sutures between the 3rd-5th somites nearly or quite obliterated.

Colours in spirit: light yellow, fingers blackish brown with whitish tips.

In the Indian Museum besides specimens from Hongkong, there are 16 specimens from Mergui, Persian Gulf, and Karachi. Fourteen little specimens from the Malabar Coast, 28 fms., are also probably referable to this species.

If this species is to be removed to *Medæus* on account of the erosion and consequent indefiniteness of the orbital end of the antero-lateral margin, *Xantho floridus* and more certainly *Xantho tuberculatus* must share the same fate, and *Medæus* must then be absorbed in *Xantho*.

#### 41. *Xantho bidentatus*, A. Milne Edwards.

*Xantho bidentatus*, A. Milne Edwards, Ann. Soc. Ent. France (4) VII. 1867, p. 266: Miers, Challenger Brachyura, p. 126, pl. xi. fig. 4: Ortmann, Zool. Jahrb. Syst., VII. 1893-94, pp. 444, 449.

Surface of carapace and appendages smooth (non-granular): gastric region well defined by fine shallow grooves, and very faintly lobulated: branchial regions imperfectly separated from the hepatic regions and very faintly and imperfectly areolated.

Of the four lobes of the antero-lateral margin the first two are faint, broadly-rounded and coalescent, and the last two possess a small acumination.

Front prominent, notched in the middle line, to form two lobes, which have the edge a little concave and the outer angle well pronounced.

Under surface of carapace smooth to naked eye: the side wall above the articulations of the legs hairy.

Chelipeds unequal in both sexes, smooth like the legs.

Abdomen of male five-jointed.

Colours in spirit: dull yellowish brown, fingers almost black.

In the Indian Museum are four specimens from the Andamans.

#### 42. *Xantho impressus*, (Lamk.) Edw.

*Cancer impressus*, Lamarck, Hist. Nat. Anim. sans. Vertèbr. V. 272.

*Xantho impressus*, Milne Edwards, Hist. Nat. Crust. I. 393: A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 198, pl. vi. fig. 2: F. Muller, Verh. Ges. Basel VIII. 1886, p. 474: de Man, Journ. Linn. Soc., Zool., XXII. 1887-88, p. 30: J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 359: Ortmann, Zool. Jahrb., Syst. VII. 1893-94, pp. 444, 449.

*Eudora impressa*, De Haan, Faun. Japon. Crust., p. 23: A. Milne Edwards in Maillard's Pile Réunion, Annexe F. p. 4: Richters in Möbius Meeresf. Maurit. p. 146, pl. xv. figs. 15, 16.

Carapace very short and broad, little convex in the anterior half, quite flat in the posterior half.

Gastric and cardiac regions separated from the wings of the carapace by very broad and deep furrows, the wings of the carapace being thrown into massive smooth lobules by furrows not quite so deep, but the gastric region being slightly and imperfectly areolate except quite anteriorly.

Front somewhat declivous, bilobed, not laminar. The four lobes of the antero-lateral margin are thickened and blunt, the first lobe being on a level lower than that of the orbit. Close in front of the thickened posterior border is a smooth transverse wrinkle.

The tooth and notch at the antero-internal angle of the merus of the external maxillipeds are very distinct.

Chelipeds equal in both sexes: outer surface of arm with a groove following the contour of the distal border; outer surface of wrist with a faintish Y-shaped dimple, and a strong double-crowned tubercle at the inner angle of the wrist; upper surface of hand with an incomplete, longitudinal, pitted furrow; fingers with cutting-edge coarsely crenulate.

Legs thick, subcylindrical, smooth; both edges of the dactylbopodites covered with thick short fur.

Abdomen of male 5-jointed, with the sutures between the 3rd-5th joints persistent.

Colours in spirit: waxy white, fingers blackish brown. The whole animal has a smooth waxy look.

In the Indian Museum are two specimens, from Mergui and the Andamans (besides three from Mauritius.)

This is a curious form, connecting *Xantho* with several other genera.



## Sub-genus LOPHOXANTHUS, A. Milne Edwards.

*Lophoxanthus*, A. Milne Edwards, Miss. Sci. Mex. Crust. p. 256.

Differs from typical *Xantho* (*Xantho floridus* etc.) chiefly in having at least the upper edge of the legs distinctly crested: the carapace, moreover, is longer and narrower.

43. *Xantho* (*Lophoxanthus*) *scaberrimus*, Walker.

*Xantho scaberrimus*, A. O. Walker. Journ. Linn. Soc., Zool., XX. 1886-90, pp. 109, 115, pl. vii. figs. 1-4.

Carapace about  $\frac{7}{8}$  as long as broad, moderately convex in the anterior two-thirds; regions and subregions strongly defined by broad deep smooth channels, convex, and covered with smooth well-defined tubercles that are pea-like in the posterior third, somewhat scale-like in the anterior two-thirds, and pointed along the antero-lateral border.

Fronto-orbital border less than half the width of the carapace: front two-lobed, the lobes having an oblique and slightly concave margin and a well-defined external angle.

Antero-lateral border four-lobed, the first lobe blunt and non-prominent, the other three prominent and acuminate, all four with the edges serrulate. Postero-lateral margin not concave, granular; posterior margin beaded.

The whole under surface of the carapace, and the surfaces of the external maxillipeds, male sternum and male abdomen, are closely covered with large granules.

Chelipeds equal, uniformly closely covered (except upper surface of arm and inner and outer surfaces of fingers) with sharpish tubercles, which are largest on the hand, where they fall into raised longitudinal parallel series, most marked on the lower part of the outer surface: fingers fluted in continuation of the ridges on the hand, the ridges of the dactylus being rough in their basal part. Two tubercles, the anterior of which is the larger, at the inner angle of the wrist: and two somewhat foliaceous excrescences terminating the crest-like upper edge of the arm.

First three pairs of legs with the edges of the merus (but especially the upper edge) sharply crested, the upper edge of the carpus and propodite strongly serrated, and the dorsal surface of the carpus and propodite furnished with squamiform granules in series parallel with this serrated crest. The last pair of legs resembles the others, except that the crest of the merus is serrated, and the dorsal surface of the merus is granular.

Colours in spirit uniform ashy white.

In the Indian Museum besides a specimen from Japan is one from off the Orissa coast, 11 fms.

*Xantho (Lophozanthus) scaberrimus* var. *baccalipes*.

Differs from the type in the following particulars:—

(1) the characteristic tubercles have everywhere a worn appearance, especially in the middle of the carapace and on the chelipeds and the ischium of the external maxillipeds:

(2) the dorsal crest of the arm and of the meropodites of the legs have each become a row of berry-like teeth, and the serrated crest and granular ridges of the carpopodites and propodites of the legs have become merely low rough elevations.

In the Indian Museum are three large males from Ceylon: the largest has the carapace 47 millim. long and 61 millim. broad.

*Xantho (Lophozanthus) scaberrimus* var. *cultripes*.

Differs from the type in the following particulars:—

(1) the characteristic tubercles are still more "worn," especially on the mesogastrium, and near the inner angle of the wrist, and near the base of the thumb, where they are almost worn away:

(2) the dorsal crest of the arm (with its foliaceous terminal lobe), and the crests of the merus carpus and propodite in all the legs, are greatly developed sharp and entire, and the raised rows of granules on the dorsal surfaces of the leg joints have almost disappeared.

In the Indian Museum is a single male from Singapore, with a carapace 50 millim. long and 64 broad.

Sub-genus *LEPTODIUS*, A. Milne Edwards.

*Leptodius*, A. Milne Edwards, Ann. Sci. Nat., Zool., (4) XX. 1863, p. 284: Nouv. Archiv. du Mus. IX. 1873, p. 221: Miss. Sci. Mex., Crust. p. 267, *ubi synon.*

*Leptodius*, Miers, Challenger Brachyura, p. 136.

*Leptodius* (e.g. *Leptodius exaratus*) resembles *Xantho* (e.g. *Xantho floridanus*) in general form and proportions, but differs most conspicuously in having the fingers hollowed out "*en cuillère*" at tip. But this divergence is almost bridged by *Leptodius crassimanus*, in which the spooning of the fingers is indistinct.

*Leptodius* further differs from the type of *Xantho* (1) in the greater convergence of the postero-lateral borders, (2) in the often—but not always—more than four-lobed antero-lateral border, and (3) in the often more extensive contact of the basal antennal joint with the front.

Key to the Indian species of the sub-genus *Leptodius*.

- I. Carpus (and sometimes the propodite also) of the four last pairs of legs strongly bicarinate dorsally—the crests enclosing a trough-like cavity ..... *L. cavipes*.
- II. Carpus and propodite of last four pairs of legs normal:—
  - i. Four teeth (exclusive of the orbital angle) on the antero-lateral border: postero-lateral border not or hardly shorter than the chord of the antero-lateral border ..... *L. exaratus*.
  - ii. More than four teeth on the antero-lateral border: postero-lateral border distinctly shorter than the chord of the antero-lateral border:—
    1. Front bilaminar, the lobes having a slightly concave edge: 5 teeth on the antero-lateral margin ..... *L. sanguineus*.
    2. Front bilaminar, the lobes so deeply concave as to make the front almost quadridentate:—
      - a. Five teeth on the antero-lateral margin: finger-tips often rather indistinctly hollowed out:—
        - a. Carapace cut up into numerous strongly convex lobules: upper surface of wrist and hand strongly and sharply rugose and nodular..... *L. euglyptus*.
        - β. Lobules of carapace not very numerous, not very convex, smooth: upper surface of wrist and hand somewhat rough ... *L. crassimanus*.
      - b. Eight to ten irregular teeth on the antero-lateral margin ..... *L. nudipes*.

44. *Xantho* (*Leptodius*) *exaratus* (Edw.) A. M. Edw.

*Chlorodius exaratus*, Milne Edwards, Hist. Nat. Crust. I. 402; and in Cuvier Règne An. Crust. pl. xi. fig. 3: Dana, Proc. Ac. Nat. Sci. Philad. 1852, p. 79; and U. S. Expl. Exp. Crust. pt. I. p. 208: Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 34.

*Leptodius exaratus*, A. Milne Edwards, Nouv. Archiv. du Mus. IV. 1866, p. 71; and IX. 1873, p. 222: Kossmanu, Reise roth. Meer. Crust. p. 32, pl. ii. fig. 1-6: Hilgendorf MB. Ak. Berl. 1878, p. 790: Richters in Möbius Meeresf. Maurit. p. 148: Haaswell, Cat. Austral. Crust. p. 60: Miers, Zool. H. M. S. Alert, pp. 188 and 214: de Man, Archiv. f. Naturges. LIII. 1887, i. p. 285, and Journ. Linn. Soc., Zool., XXII. 1887-88, p. 33; and in Weber's Zool. Ergebn. Niederl. Ost. Ind. II. 1892 p. 278, and Zool. Jahrb., Syst., VIII. 1894-95, p. 521: Cano, Boll. Soc. Nat. Napoli, III. 1889, p. 202: J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 362; Whitelegge, Mem. Austral. Mus. III. 1897, p. 137.

*Xantho affinis*, De Haan, Faun. Japon. Crust. p. 48, pl. xiii. fig. 8 : Krauss, Sudafr. Crust. p. 30.

*Xantho lividus*, De Haan, O.c., l.c. fig. 6 : Miers, Zool. H. M. S. Alert, pp. 183, 214.

*Cancer inæqualis*, Audouin and Savigny Descr. Egypte pl. v. fig. 7 (*vide* A. M. E.)

*Xantho searatus* var. *typica*, Ortmann, Zool. Jahrb., Syst., VII. 1893-94, p. 445 : and in Semon's Forschungen. (Jen. Denk. VIII) Crust. p. 50.

Carapace moderately broad, moderately convex in the anterior two-thirds, nearly flat in the posterior third, where also it is not areolated. Gastric region well-defined, convex, fairly well areolated anteriorly, the wings of the carapace on either side of it divided into about 5 low lobules, three of which follow the contour of the antero-lateral border. The surface of the carapace is non-granular, except sometimes in the young.

Front not very prominent, but projecting beyond the inner angle of the orbit, from which it is separated by a notch ; bilaminar, the lobes cut square, but with a slightly concave margin.

Antero-lateral border cut into 4 acuminate teeth, not including the outer angle of the orbit, or a small denticle below it. Postero-lateral border equal in length to the chord of the antero-lateral border.

Side wall of carapace, edges of upper surface of arm, and edges of legs—but especially the upper edge of the meropodites—with a good deal of hair.

Chelipeds unequal in both sexes. Upper and outer surface of wrist more or less dimpled or wrinkled ; a strong tubercle at inner angle of wrist. Hands usually smooth, but the upper surface has, very commonly, some low fine transverse or reticulating wrinkles. Fingers large, thick, more or less fluted, not strongly toothed, meeting at tip only (in the adult) where they are broadened and hollowed out.

Legs with merus subcylindrical and smooth, carpus and propus nearly smooth and sometimes very faintly grooved, dactylus granular and furred along both edges as far as the claw.

Abdomen of male five-jointed.

Colours in spirit : dirty yellow or dirty green, sometimes mottled ; fingers black.

In the Indian Museum are more than 130 specimens, chiefly from the Andamans, Mergui, Karachi, also from the Persian Gulf, Bombay, Ceylon, Akyab and Penang.

#### 45. *Xantho (Leptodius) sanguineus* (Edw.) A. M. Edw.

*Chlorodius sanguineus*, Milne Edwards, Hist. Nat. Crust. I. 402 : Dana Proc. Ac. Nat. Sci. Philad. 1852, p. 79, and U. S. Expl. Exp. Crust. pt. I. p. 207, pl. xi. figs. 11a-d : Heller, Novara Crust. p. 18 : Streets, Bull. U. S. Nat. Mus. VII. 1877. p. 105.

*Leptodius sanguineus*, A. Milne Edwards, Nouv. Archiv. du Mus. IV. 1868, p. 71, and IX. 1873, p. 224: Richters in Möbius, Meeresf. Maurit. p. 147: Haswell, Cat. Austral. Crust. p. 60: F. Müller, Verh. Ges. Basel, VIII. 1886, p. 474: de Man, Zool. Jahrb., Syst. VIII. 1894-95, p. 521: Whitelegge, Mem. Austral. Mus. III. 1897, p. 137.

*Leptodius exaratus*, var. *sanguineus*, Miers, P. Z. S. 1877, p. 134; Ann. Mag. Nat. Hist. (5) V. 1880, p. 234; Challenger Brachyura, p. 138: Cano, Boll. Soc. Nat. Napoli, III. 1889, p. 203.

*Lagostoma nodosa*, Randall, Journ. Ac. Nat. Sci. Philad. 1839, p. 111.

*Chlorodius nodosus*, Dana, Proc. Ac. Nat. Sci. Philad. 1852, p. 79, and U. S. Expl. Exp. Crust. pt. I. p. 210, pl. xi. figs. 14a-g.

*Chlorodius edwardsi*, Heller, Abh. zool.-bot. Ges. Wien, 1861, p. 10, and SB. Ak. Wien XLIII. 1861, i. p. 336: Hilgendorf in v. d. Decken's Reis. Ost. Afr. III, i. p. 74.

*Xantho exaratus* var. *sanguinea*, Ortmann, Zool. Jahrb. Syst. VII. 1893-94, p. 447.

Differs from *Xantho* (*Leptodius*) *exaratus* in the following particulars:—

(1) the carapace is more convex anteriorly, and the branchial lobules also are more convex:

(2) there are five teeth on the antero-lateral margin, not including the external orbital angle and a small denticle below it:

(3) the postero-lateral border is a good deal shorter than the chord of the antero-lateral border:

(4) the front is distinctly narrower.

In the Indian Museum are 123 specimens chiefly from the Andamans and Laccadives, also from the Nicobars, Ceylon, and Persian Gulf.

#### 46. *Xantho* (*Leptodius*) *crassimanus*, A. M. Edw.

*Xantho crassimanus*, A. Milne Edwards, Ann. Soc. Ent. France (4) VII. 1867 p. 267.

*Leptodius crassimanus*, A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 226, pl. xi. fig. 4: Haswell, Cat. Austral. Crust. p. 61: Müller, Verh. Ges. Basel, VIII. 1886, p. 474: de Man, Archiv. für Naturges. LIII. 1887, i. p. 287, and Notes Leyden Mus. XV. 1893, p. 284, and Zool. Jahrb., Syst. VIII. 1894-95, p. 522.

*Xantho exaratus* var. *crassimana*, Ortmann, Zool. Jahrb. Syst. VII. 1893-94, p. 448.

Differs from both *exaratus* and *sanguineus* in the following particulars:—

(1) the two lobes of the front have the free edge not merely emarginate, but deeply concave, so that the front appears to be formed of four little teeth:

(2) the carapace, anteriorly, is much more convex, the regions are more convex and their areolæ are more convex:

(3) the fingers are not so broad at tip and not so sharply hollowed out:

(4) the upper surface of the wrist and hand is more rugose. It resembles *sanguineus* in having 5 teeth on the antero-lateral margin, but differs from it further in having

(5) the front even narrower, it being less than one-fifth the breadth of the carapace.

It can at once be distinguished by the *very narrow* quadridentate front.

In the Indian Museum are 22 specimens, from the Andamans, Karáchi, Galle (and Australia).

#### 47. *Xantho (Leptodius) nudipes* (Dana), A. M. Edw.

*Chlorodius nudipes*, Dana, Proc. Ac. Nat. Sci. Philad. 1852, p. 79, and U. S. Expl. Exp. Crust. pt. I. p. 209, pl. xi. figs. 12a-c.

*Leptodius nudipes*, A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 225; Miers, Cat. Crust. New Zealand, p. 17; Filhol, Crust. New Zealand, p. 374; de Man, Journ. Linn. Soc. Zool., XXII. 1887-88, p. 33, and Zool. Jahrb. Syst. 1894-95, p. 523.

*Xantho esaratus* var. *nudipes*, Ortmann, Zool. Jahrb. Syst. VII. 1893-94, p. 447.

The whole surface of the carapace is very finely pitted or granular. The antero-lateral border is divided into four acute lobes or teeth, but each of the first three teeth have, at base, either one or two (one on either side) small additional cusps, and the fourth tooth is generally double, so that altogether there are from 8 to 11 teeth on the antero-lateral margin. The fingers are broad and deeply hollowed at tip. The upper surface of hand and wrist is granular and rugose. The lobes of the front are deeply concave.

In the convexity of the carapace and of its regions and subregions it resembles *sanguineus*; but the front is much broader than in *sanguineus*, being more than one-fourth the breadth of the carapace, and the fingers are typical spoons.

In the Indian Museum are 17 specimens from the Andamans and 3 from Mergui.

#### 48. *Xantho (Leptodius) euglyptus*, n. sp.

Form of carapace much resembling that of *sanguineus*, but much more convex.

Carapace  $\frac{3}{4}$  as long as broad, rather strongly convex in its anterior two-thirds, flat posteriorly: its regions well delimited, convex, and as completely areolated as any *Actæa*—the areolæ being strongly convex and somewhat pitted transversely.

Front projecting beyond the orbit, from which it is separated by a notch, cut into two lobes of which the outer angle is prominent much as in *crassimanus*; its breadth is not quite a third that of the carapace.

Antero-lateral border cut into five conical teeth between which are granules or little denticles; postero-lateral borders strongly convergent, shorter than chords of antero-lateral borders.

Chelipeds unequal: upper and outer surfaces of wrist strongly wrinkled and pitted; upper surface of hand nodular, upper half or more of outer surface of hand longitudinally ridged and transversely wrinkled: fingers short, stout, hollowed (but not broadened) at tip.

Legs with carpus and propodite longitudinally ridged and grooved above—the carpus more distinctly so—and dactylus furred.

Sidewall of carapace, edges of upper surface of arm, and edges of legs—but especially upper edge of meropodites—hairy.

Colours in spirit: yellow, fingers and front lower corner of hand blackish brown.

Length of carapace 10.5 millim., breadth 16 millim.

In the Indian Museum are 45 specimens from Galle and 1 from Mergui (Marine Survey).

This species, though strongly resembling *nudipes* and *crassimanus*, is at once recognized by the sharp-cut Actæa-like sculpture of the carapace. It is possible that it may be the *Chlorodius eudorus* of Milne Edwards. It has the closest possible resemblance to the *Xantho quinquedentatus* of Krauss, Sudnfr. Crust. p. 30, pl. i. fig. 3, but that species is described and figured as having sharp fingers.

#### 49. *Xantho (Leptodius) cavipes* (Dana).

*Chlorodius cavipes*, Dana, Proc. Ac. Nat. Sci. Phila., 1852, p. 79; and U. S. Expl. Exp. Crust. pt. I. p. 212, pl. xii. figs. 1a-b; Stimpson, Proc. Ac. Nat. Sci. Phila., 1858, p. 34.

*Leptodius cavipes*, de Man, Journ. Linn. Soc., Zool., XXII. 1887-88, p. 34.

Carapace convex in anterior two-thirds, flat behind. Gastric region convex, well delimited and areolated by fine smooth rather deep channels; wings of carapace divided into about five lobules by less deep-cut and less smooth channels: the whole carapace (except the channels) covered with miliary granules, which on the lateral lobes of the gastric region are arranged in lines that have an imbricate look.

Front bilaminar, the fore edge of the lobes thickened and granular. Antero-lateral border thickened and granular, cut into small irregular teeth—8 or 9 in number—which fall into 4 sets. Undersurface of carapace with short fur.

Chelipeds unequal: upper and outer surface of wrist and hand wrinkled and granular, outer surface of hand covered with granules in more or less distinct lines: fingers little toothed, incurved, blunt-pointed and hollowed (but not broadened) at tip.

Legs rough, but not very hairy: upper edge of meropodites finely serrated, distally sharply notched: *upper surface of carpopodites with two high longitudinal crests enclosing a trough-like space*; the propodites are similarly sculptured, but the sculpture is a good deal concealed by fur: dactyli furred.

Colours in spirit: dirty yellow or dirty greenish, fingers nearly black in distal  $\frac{2}{3}$  only.

In the Indian Museum are 4 specimens, from the Andamans, Mergui and Ceylon.

#### MEDÆUS, Dana.

*Medæus*, Dana, Silliman's Amer. Journ. Sci. and Arts, (2) XII. 1851, p. 125; Proc. Ac. Nat. Sci. Philad. 1852, p. 76; U. S. Expl. Exp. Crust. pt. I. p. 181.

*Medæus*, A. Milne Edwards, Ann. Sci. Nat. Zool. (4) XX. 1863, p. 279; Miss. Sci. Mex. Crust. p. 249.

*Medæus*, Miers, Challenger Brachyura, p. 116.

Carapace not very broad, hexagonal, little convex, the regions well defined and well areolated.

Antero-lateral borders cut into teeth and *very distinctly continued beneath the orbits to the angles of the buccal cavern*.

Fronto-orbital border half, or a little more than half, the greatest breadth of the carapace.

Front about a fourth, or a little more, the greatest breadth of the carapace, horizontal, rather prominent, square-cut, notched in the middle line, separated from the supra-orbital margin by a notch.

Orbits, eyes, basal antennal joint and antennary flagellum as in *Xantho*.

Chelipeds either unequal or subequal, the wrists and hands commonly covered with large nodules, the fingers pointed.

The abdomen of the male consists of five pieces, the 3rd-5th somites being fused.

*Medæus* closely resembles *Xantho*, but is distinguished by the narrower carapace and by the relations of the antero-lateral border. In some species of *Xantho* (e.g., *X. distinguendus*) the antero-lateral border is broken and eroded near the orbit, so that it may be imagined to be continued to the angle of the buccal cavern, but in *Medæus* there is no ambiguity whatever.

#### 50. *Medæus nodosus*, A. M. Edw.

*Medæus nodosus*, A. Milne Edwards, Ann. Soc. Ent. France, (4) VII. 1867, p. 271; Nouv. Archiv. du Mus. IX. 1873, p. 212, pl. viii. fig. 2: Haswell, Cat. Austral. Crust. p. 52.

Carapace shaped much as in *Polycræmus*, hexagonal, more than  $\frac{3}{4}$



as long as broad, the regions well demarcated, well areolated, finely and closely granular.

Front horizontal, square-cut, prominent, sublaminar, notched and grooved in the middle line.

Antero-lateral borders cut into four blunt-pointed rather coarse granular teeth, of which the two posterior are the strongest.

Chelipeds subequal: wrist and hand covered with granular fungi-form tubercles, which are arranged in regular longitudinal series on the hand.

Upper border of meropodites of legs without spinules.

In the Indian Museum is a single small male from off the Ganjam coast,  $7\frac{1}{2}$ – $9\frac{1}{2}$  fms.

Henderson (Trans. Linn. Soc. (2) V. 1893, p. 360) appears to consider this species to belong to the genus *Halimede*, but it has not—if my identification be correct—the curious male abdomen which distinguishes that genus from every other Xanthoid except *Polycremnus*.

#### CYCLOXANTHUS, A. Milne Edwards.

*Cyclozanthus*, A. Milne Edwards, Ann. Sci. Nat., Zool. (4) XX. 1863, p. 278; Nouv. Archiv. du Mus. IX. 1873, p. 209; Miss. Sci. Mex., Crust. p. 258.

Carapace relatively long: front horizontal, prominent, and divided by a median fissure into two lamellar lobes, and separated from the internal orbital angles by a deepish notch.

Orbits small: two fissures in the supra-orbital margin: external orbital angles inconspicuous, continuous with the antero-lateral borders.

Antero-lateral borders very long, strongly curved, extending far backwards.

Basal antennal joint short, but touching the front at its inner angle: the flagellum inserted in the orbital hiatus.

Merus of the external maxillipeds subquadrilateral.

The abdomen of the male consists of five movable pieces.

This genus is not represented in the Indian Museum.

#### 51. *Cyclozanthus lineatus*, A. Milne Edwards.

*Cyclozanthus lineatus*, A. Milne Edwards, Ann. Soc. Entom. France, (4) VII. 1867, p. 269, and Nouv. Archiv. du Mus. IX. 1873, p. 209, pl. vi. fig. 5: Miers, Zool. H. M. S. Alert, pp. 183, 212: J. B. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 360.

Carapace broad, very depressed, smooth; the regions little defined; antero-lateral borders prolonged far backwards and obscurely divided into four dentiform lobes.

Outer orbital angle inconspicuous, orbits small, the upper margin with a narrow cleft.

Front very prominent, lamellar, a little sinuous at the sides, prominent towards the middle where there is a linear fissure.

Chelipeds unequal: the hand has the inner surface flattened, the upper border obtusely crested, and the outer surface rugose: the wrist, which has its outer border much dilated, is equally rugose.

The legs are weak and smooth, the dactylus being a little compressed.

Carapace yellowish, very symmetrically marked with numerous reddish-brown lines, some of which run obliquely from the antero-lateral borders towards the front and towards the middle line, while others run from the posterior border forwards to the cardiac region.

There are no specimens in the Indian Museum collection.

#### HOPLOXANTHUS, n. gen.

Carapace hexagonal, moderately broad, moderately convex fore and aft, its regions all well defined, and to a certain extent subdivided.

The antero-lateral borders are thin and crest-like and are on a much lower plane than the rest of the carapace, *they end either in both sexes or in the female only, in a large horizontal lateral epibranchial spine*, and may either be cut into large triangular teeth or may be only obscurely notched.

Postero-lateral borders straight, moderately convergent, about as long as the antero-lateral.

Front lamellar, prominent, horizontal, notched in the middle line, about a fourth to two-sevenths the greatest breadth of the carapace.

Orbital margin with two faintish notches or suture lines above, and with a small triangular gap just below the outer angle: the inner angle of the lower orbital margin forms a strongly-projecting tooth: the outer orbital angle is confluent with the antero-lateral margin.

The antennules fold obliquely. The basal antennal joint is rather slender and meets the front: the flagellum, which is about as long as the major diameter of the orbit, is lodged in the orbital hiatus.

The anterior edge of the external maxillipeds is almost transverse.

Chelipeds unequal, fingers sharp pointed: legs rather slender.

No ridges, defining the efferent branchial channels, on the plate.

The abdomen of the male consists of seven separate segments, the last segment being no longer than the longest of the others.

This genus is closely allied to *Xantho* and *Cycloxanthus*, it is also related not distantly to *Halimede* and to *Lophozozymus*.

52. *Hoploxanthus hextii*, n. sp.

The whole of the carapace, legs, and outer surface of chelipeds is covered with a dense, darkish, extremely short, velvety or branny pubescence.

Carapace hexagonal, moderately broad, moderately convex, the regions well defined, tumid, their convexities granular.

Front prominent beyond the orbits and separated from them by a notch, square-cut, bilaminar.

Antero-lateral border thin sharp, cut into four triangular lacinate teeth, the last of which—in the female but not in the male—is an acute salient spine.

The edges of all the teeth, of the front, and of the orbit are finely granular.

The postero-lateral border is elegantly granular and quite straight: dorsal to it the wall of the carapace forms a distinct postero-lateral facet, sharply marked off from the general surface of the carapace.

Chelipeds a little unequal in both sexes: wrist with a small somewhat cristiform expansion at the outer angle and a tooth at the inner angle: upper surface of hand with two or three longitudinal raised sculptured lines, the innermost of which consists of a blunt cristiform lobule followed by one or two blunt denticles, the outer one or two being simply crenulate and granular; the outer surface of the smaller hand is everywhere granular, that of the larger hand is granular in part—in both cases some of the granules form slightly-raised longitudinal lines.

Legs long, slender.

Colours in spirit yellowish brown.

Carapace of male 10 millim. long, 13 millim. broad; of female, 11 millim. long, 17 millim. broad.

In the Indian Museum are 3 specimens from the east coast of India and 2 from the Nicobars.

53. *Hoploxanthus cultripes*, n. sp.

Carapace hexagonal: the three gastric subregions (lateral and post-medial), the cardiac region, and two (smaller) median epibranchial regions stand out as very prominent granular bosses, and the convexity of the lateral epibranchial spine, and the postero-lateral border and its neighbourhood are granular,—otherwise the carapace is quite smooth.

Front prominent, sublaminar, with a curved convex finely granular edge, faintly notched in the middle line and hardly separated from the supra-orbital angles.

Antero-lateral borders very thin and sharp, obscurely divided by faint notches and fainter grooves into 3 broad inconspicuous lobes, and ending in a strong horizontal pyramidal lateral epibranchial spine.

The chelipeds in the unique specimen are lost; but the legs are remarkable in having the upper edge of the merus and carpus sharply carinate, the carpal joints having a second blunter and lower keel along the dorsal surface.

The legs and the undersurface of the body are covered with the same dense extremely short pubescence as occurs in *H. hextii*.

The single imperfect male in the Indian Museum comes from Karáchi, and is 9 millim. long and 13 millim. broad.

#### ORPHNOXANTHUS, n. gen.

Carapace, owing to the inflation of the branchial regions almost quadrilateral in outline and almost concave from side to side, but very decidedly convex fore and aft, broad, the regions well defined but not to any great extent areolated.

Fronto-orbital border a little more than half the greatest breadth of the carapace in extent. Front about a third the greatest width of the carapace, lamellar, projecting horizontally beyond the orbits, broadly and faintly bilobed. Orbital margin entire: orbits and eyes small.

Antero-lateral border cut into four teeth; postero-lateral borders convergent only in the posterior half; posterior border long.

The antennules fold almost transversely. The basal antennal joint is very short and only just touches the turned down edge of the front; the flagellum which is very long (between 2 and 3 times the length of the orbit) is lodged in the narrow orbital hiatus.

Owing to the bulge of the outer wall of the efferent branchial canal and the consequent puffing out of the pterygostomian regions, the front edge of the merus of the external maxillipeds is quite transverse or even slightly oblique from without inwards.

The chelipeds are massive and unequal; the fingers are compressed and pointed. The legs are very slender.

The abdomen of the male consists of 5 segments, the 3rd-5th somites being fused.

Owing to the inflation of the pterygostomian regions the efferent branchial channels are permanently open, but the low crests that define them are confined to the posterior part of the endostome.

This genus appears to represent one of the links between *Galene* and *Xantho*. The single known species comes from the Bay of Bengal, 105-350 fms.

54. *Orphnozanthus microps*, Alcock and Anderson.

*Xanthodes microps*, Alcock and Anderson, J. A. S. B. LXIII. pt. 2, 1894, p. 183.

Carapace about  $\frac{2}{3}$  as long as broad, almost quadrilateral in outline, strongly convex fore and aft, but, owing to the inflation of the branchial regions, a little *concave* from side to side; it is rather closely covered with a very fine short fur, beneath which the surface may be granular or nearly smooth, but the margins are always granular. The regions are all well defined and are slightly tumid: the gastric region is divided into 3 gently tumid subregions, the branchio-hepatic regions are subdivided transversely into three areas, and the fronto-orbital margin is also marked off.

The antero-lateral border is thin and sharp and is cut into four sharp finely granular teeth, the first of which runs by a long nearly transverse margin, into the (undefined) angle of the orbit. The front is laminar and projects beyond the supra-orbital margin; it is square-cut and is slightly notched in the middle line, so as to form two broad shallow lobes. The eyes are small and are to a variable extent deficient in pigment.

The chelipeds are unequal—very much more so in the male than in the female: the arm to a variable extent, the entire surface of the wrist, and the upper border of the hand are scabrous and more or less hairy; the other surfaces of the hand may be smooth and polished, or the outer surface may be to a variable extent granular: the fingers are large, compressed and pointed.

In the male the larger cheliped is about  $2\frac{1}{2}$  times the length of the carapace (the hand and fingers forming slightly more than half the length) and nearly half the arm projects beyond the carapace in repose.

The legs are long slender and finely and sparsely hairy: the upper edge of the meropodites is scabrous or closely spinulate.

Colours in spirit; chestnut brown with blackish fingers. Length of carapace (average) 11 millim., breadth 15 to 16 millim.

In the Indian Museum are 29 specimens from the Bay of Bengal, 105–350 fms.

## ETISUS, Milne Edwards.

*Etisus*, Milne Edwards, Hist. Nat. Crust. I. 410.

*Etisus*, Dana, Silliman's Amer. Journ. Sci. and Art. (2) XII. 1851, p. 126; and U. S. Expl. Exp. Crust. pt. I. p. 183.

*Etisus*, A. Milne Edwards, Ann. Sci. Nat., Zool., (4) XX. 1863, p. 291; and Nouv. Archiv. du Mus. IX. 1873, p. 233.

*Etisus*, Miers, Challenger Brachynra, p. 131.

Carapace broad, moderately convex in both directions, with the

regions delimited by broad shallow rather indistinct depressions and having a slightly uneven but not definitely lobulated surface.

The front is laminar and narrow; it projects well beyond the supra-orbital border from which it is separated by a deep notch, and is split by a suture in the middle line. The orbital margin is broken by three sutures or actual fissures, and the tooth at the inner angle of the lower border is very prominent.

The antero-lateral borders, which are a good deal longer than the postero-lateral, are cut into from 4 to 8 lobes or procurved spines.

The basal antennal joint has its outer angle produced and tightly wedged into the internal orbital gap, which it fills; but the flagellum, which is of good length, does not arise within the orbit but at the base of this process.

The outer border of the merus of the external maxillipeds is oblique.

The chelipeds, which are very massive and rather long, are a little unequal in the male: the fingers are very stout and strongly arched, and they meet only at the tip, which is broad expanded and hollowed out almost like a horse's hoof.

The abdomen of the male is five-jointed, the 3rd-5th somites being fused.

#### *Key to the Indian species of Etisus.*

- I. More than four teeth on the antero-lateral border, excluding the external angle of the orbit: free edge of front not convex: the process of the basal antennal joint completely separates the lower from the upper inner angle of the orbit: legs spiny:—
  - i. Seven or eight uneven unequal-sized claw-like teeth on the antero-lateral border ..... *E. dentatus.*
  - ii. Seven evenly arranged broad compressed procurved teeth of almost uniform size on the antero-lateral margin ..... *E. utilis.*
- II. Four teeth (excluding the external angle of the orbit) on the antero-lateral border: free edge of front bow-shaped: the tooth at the inner canthus of the orbit in contact with the cave of the orbit beyond the tip of the process of the basal antennal joint: legs not spiny ..... *E. lavimanus.*

#### 55. *Etisus dentatus*, (Herbst) Edw.

*Cancer dentatus*, Herbst, Krabben, I. ii. 186, pl. xi. fig. 66.

*Etisus dentatus*, Milne Edwards, Hist. Nat. Crust. I. 411: Dana, U. S. Expl. Exp. Crust. pt. I. 185, pl. x. figs. 2a-b: A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 233: Miers, P. Z. S. 1877, p. 134: Richters in Möbius, Meeresf. Maurit.

p. 146: Lenz and Richters, Abh. Senck. Ges. XII. 1881, p. 421: Haswell, Cat. Austral. Crust. p. 53.

*Etisodes dentatus*, Ortmann, Zool. Jahrb. Syst. VII. 1893-94, p. 472.

Carapace smooth (non-granular): gastric region well defined except at cardiac end, its surface broken, but not definitely lobulated; similarly with the branchio-hepatic regions.

The antero-lateral border bears 7 or 8 (exclusive of the external orbital angle) pro-curved claw-like teeth, uneven both as to size and place, though four of them—which correspond to the 4 lobes of so many other Cancroids—are much of one size and much larger than the other 3 or 4.

The front is lamellar with the free edge slightly and angularly emarginate, and is cleft in the middle line by a fine sharp groove that extends well on to the gastric region. The orbital margin has three teeth, separated by fissures, in its outer part. The tooth at the inner angle of the lower edge of the orbit is sharp, and does not come into contact with the eave of the orbit.

Chelipeds in the adult male a little more, in the adult female a little less than twice the length of the carapace: the arm has a few spinules and a good deal of hair along the upper border, and some granules or blunt spinules along its lower and its distal borders; the wrist has a strong spike at its inner angle; the hand may or may not have a few pimple-like granules on its upper outer surface; and the fingers are fluted, the ridges on the dactylus being crenulate or dentate. Otherwise the chelipeds are smooth.

In the legs, the merus has both the dorsal and the ventral edges thickly fringed with long stiff hairs, the dorsal edge being also granular; the carpus has at least three series of spinules along its dorsal surface; the propodite has a rather granular surface with about four (dorsal) series of spinules, and has much of its lower edge fringed with long stiff hairs; and the dactylus is spiny above and hairy below.

Colours of a specimen 7 years in spirit: upper surface bright maroon fading to yellow near the posterior border; fingers black.

In the Indian Museum are a young female from Port Blair (Andamans), and three large males (carapace 72 millim. by 111 millim.) from Great Coco I. (Andamans) and East I. Andamans.

### 56. *Etisus utilis*, Lucas.

*Etisus utilis*, Lucas in Jacquinot, Voy. Astrolabe, Crust. p. 27, pl. ii. fig. 6: Heller, Novara Crust. p. 16: A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 233: E. Nauck, Zeits. Wiss. Zool. XXXIV. 1890, p. 58 (gastric teeth): Lenz and Richters, Abh. Senck. Ges. XII. 1881, p. 421: Ortmann, Zool. Jahrb. Syst. VII. 1893-94, p. 472.

Carapace smooth (non-granular), distantly pitted in the anterior and lateral parts. Gastric region fairly well defined, except at the cardiac end, its surface showing indistinct traces of lobulation: branchio-hepatic regions with the surface a little uneven.

Antero-lateral border with 7 (exclusive of the external orbital angle) regular, even, nearly uniform, compressed, procurved teeth.

Front as in *Etisus dentatus*, but with the angles a little sharper cut. The edge of the orbit is trenchant, and near the outer angle are 3 not very distinct suture-lines: the tooth at the inner angle of the lower border of the orbit is prominent, and does not come into contact with the eave of the orbit.

Chelipeds in the adult male twice to twice-and-a-half, in the adult female once-and-a-half to once-and-two-thirds the length of the carapace: upper and lower edges of arm coarsely and unevenly granular, much of the upper edge also hairy; distal end of wrist with 4 or 5 teeth, the inner two of which are long and large; the hand has, along its upper border, a double crest of strong teeth, continued in blunter form along the finger, and on the outer surface of the hand there may be a few pimple-like granules.

In the legs, both the upper and lower edges—but most the upper edge—of the merus, carpus and propodite are thickly fringed with long bristles, as also is the lower edge of the dactylus; the upper edge of the merus has also a row of small spines, and the upper edge of the carpus, propus and dactylus a double row of increasingly larger spines: the lower edge also of the propus and dactylus is spiny.

Colours in spirit: dull yellowish pink, fingers black.

In the Indian Museum are a male and a female from the Singapore Museum, and supposed to have come from Singapore. (Heller l.c. records this species from the Nicobars).

#### 57. *Etisus laevimanus*, Randall.

*Etisus laevimanus*, Randall, Journ. Acad. Nat. Sci. Philad. 1839, p. 115: Dana. Proc. Ac. Nat. Sci. Phila. 1852, p. 76, and U. S. Expl. Exp. Crust. pt. I. p. 185, pl. x. figs. 1a-b: A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 234: Kossmann, Reise roth Meer. Crust. p. 30: T. Tozzetti, Magenta Crust. p. 29: Streets, Bull. U. S. Nat. Mus. VII. 1877, p. 105: Hilgendorf, MB. Ak. Berl. 1878, p. 791: Richters in Möbius Meeresf. Maurit. p. 146: de Man, Notes Leyden Mus. III. 1881, p. 99; and Archiv. für Naturges. LIII. 1887, i. p. 289; and Zool. Jahrb. Syst. VIII. 1894-95, p. 527: Haswell, Cat. Austral. Crust. p. 54: Miers, Zool. H. M. S. Alert, pp. 183, 217; and Challenger Brachyura, p. 132: F. Müller, Verh. Ges. Basel VIII. 1886, p. 474: J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 362: Ortmann, Zool. Jahrb. Syst. VII. 1893-94, p. 473: Whitelegge, Mem. Austral. Mus. III. 1897, p. 131.



*Etisus macroductylus*, Lucas in Jacquinot's Voy. Astrolabe, Crust. p. 30, pl. ix. fig. 2, (A. M. E.)

*Etisus convexus*, Stimpson, Proc. Ac. Nat. Sci. Phila. 1858, p. 81.

*Etisus maculatus*, Heller, Abh. zool.-bot. Ges. Wien XI. 1861, p. 9; and SB. Ak. Wien, XLIII. 1861, p. 332; de Man, Notes Leyden Mus. II. 1880, p. 173.

Gastric region well defined on all sides, its anterior part distinctly lobulated; branchio-hepatic regions with three lobules following the curve of the antero-lateral margins.

Antero-lateral border with 4 broad teeth (exclusive of the external orbital angle), the last two of which culminate in procurved points.

The front is cleft in the middle line by a groove; its free edge is bow-shaped. The orbital margin has, in its outer half, three lobular constrictions defined by three grooves.

The tooth at the inner angle of the lower edge of the orbit is blunt, and it comes into contact with the eave of the orbit beyond the tip of the process of the basal joint of the antenna.

Chelipeds in the adult male about twice and a half, in the adult female a little less than twice the length of the carapace; the wrist has a blunt spine at the inner angle, otherwise they are smooth and unsculptured.

Legs with both edges of all the long joints hairy, most so on the lower edge of the dactylus and on the upper edge of the other joints: the upper edge of the propodite and dactylus is also sharply granular, but there are no spines.

Colours in spirit variable: dull yellow, or dull greenish-brown, or sea-green, often with cinnamon coloured patches or small spots.

In the Indian Museum are 20 specimens, from Persian Gulf, Karáchi, Bombay, Laccadives, Andamans, and Singapore, (besides specimens from Celebes and Mauritius).

#### ETISODES, Dana.

*Etisodes*, Dana, Silliman's Amer. Journ. Sci. and Arts, (2) XII. 1851, p. 126 (footnote); Proc. Ac. Nat. Sci. Phila. 1852, p. 77; and U. S. Expl. Exp. Crust. pt. I. p. 184.

*Etisodes*, A. Milne Edwards, Ann. Sci. Nat., Zool., (4) XX. 1861, p. 291; and Nouv. Archiv. du Mus. IX. 1873, p. 235.

The genus *Etisodes* resembles *Etisus* in the characteristic form and lie of the basal joint of the antennæ, and in the characteristic relation of the front to the orbits; but it differs in the following particulars:—

The carapace is much longer and narrower; it is less convex, especially in its posterior third; its regions are clearly defined, and are definitely sculptured into lobules in the anterior two-thirds of the carapace: the

chelipeds are much shorter, the difference in length being chiefly in the arm; and the fingers though well hollowed out at tip are not so hoof-like.

### 58. *Etisodes anaglyptus*, (Edw.)

*Cancer anaglyptus*, Milne Edwards in Cuvier, Règne An. Crust. pl. xi. fig. 4.

*Etisus anaglyptus*, Milne Edwards, Hist. Nat. Crust. I. 411: Hess, Archiv. für Naturges. XXXI. 1865, i. p. 134: de Man, Notes Leyden Mus. XIII. 1891, p. 7.

*Etisodes anaglyptus*, A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 235: Haswell, Cat. Austral. Crust. p. 55: Miers, Zool. H. M. S. Alert, pp. 183, 218: Ortmann, Zool. Jahrb. VII. 1893-94, p. 471.

Length of carapace nearly three-quarters the breadth.

The regions are all convex and well defined, and the gastric and branchio-hepatic regions are subdivided into convex lobules, the surface of which is somewhat dented transversely.

The antero-lateral border is cut into four (excluding the external angle of the orbit) procurved teeth, the last two of which are claw-like.

The front projects strongly, and is divided into two dorsally-convex lobes, of which the free edge may either be cut obliquely inwards, or be so excised as to give the front a four-pronged look.

The orbital margin has, in its outer half, three grooves separating three blunt teeth: the tooth at the lower inner angle does not come in contact with the eave of the orbit.

Chelipeds in the male not much more than half again as long as the carapace: upper and anterior borders of arm hairy; upper surface of wrist nodular, with two teeth (one large) at the inner angle; upper outer surface of hand with rather irregular longitudinal series of little nodules and granules; dactylus fluted, the ridges being crenulated.

Legs very shaggy, the hairs almost concealing some lines of sharp granules or spinules on the propodite and dactylus.

In the Indian Museum is a specimen from the Persian Gulf (besides one from Samoa).

### 59. *Etisodes electra* (Herbst), Miers.

*Cancer electra* and ? *metis*, Herbst, Krabben, III. ii. 34 and 36, pl. li. fig. 6, and pl. liv. fig. 3.

*Etisus rugosus*, Lucas in Jaquinot's Voy. Astrolabe III. Crust. p. 33, pl. iv. fig. 2 (*fide* A. M. E., *infra*).

? *Chlorodius dentifrons*, Stimpson, Proc. Ac. Nat. Sci. Phila. 1858, p. 34.

*Etisodes sculptilis*, Heller, Abh. zool.-bot. Ges. Wien XI. 1861, p. 10, and SB. Ak. Wien XLIII. 1861, p. 333: A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 236, pl. ix. fig. 2: Kossmann Reise rothl. Meer., Crust. p. 80.

*Chlorodius samoensis*, Miers, Ann. Mag. Nat. Hist. (4) XVI. 1875, p. 341 (Miers *infra*.)

*Etisodes electra*, Miers, Zool. H. M. S. Alert, pp. 183, 217, 517, 532: de Man, Archiv. für Naturges. LIII. 1887, i. p. 290: J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 362.

Closely resembles *E. anaglyptus*, from which it is distinguished by the following characters:—

(1) the carapace is even longer and narrower, the length being quite  $\frac{2}{3}$  the breadth;

(2) the whole surface of the lobules of the carapace and of the nodules of the wrist and hand is closely granular;

(3) the front is cut into four teeth of nearly equal size;

(4) the legs, though hairy, are not so shaggy.

In the Indian Museum are 4 specimens from the Andamans and Nicobars, (besides three from Upolu and Mauritius).

#### Alliance V. *Halimede*ida.

Halimede.

Polycræmnus.

#### POLYCRÆMNUS, Gerstaecker.

*Polycræmnus*, Gerstaecker, Archiv. für Naturges. XXII. 1856, p. 120.

Carapace approaching the pentagonal, not very much broader than long, distinctly convex fore-and-aft, slightly convex from side to side, the regions rather indistinctly defined and to a certain extent subdivided by broad shallow depressions.

The antero-lateral border is elegantly four-lobed and is continued beneath the orbits to the outer angle of the buccal cavern. The postero-lateral borders are moderately convergent and are about equal in length to the antero-lateral borders and also to the posterior border.

The fronto-orbital border is less than half the greatest width of the carapace in extent. The front is narrow (less than a fourth the greatest breadth of the carapace), sublaminae or hood-like, bilobed, and projects well beyond the orbits. The three grooves in the vicinity of the outer angle of the orbit are distinct. Eyes on short thick stalks. The inner angle of the lower edge of the orbit is strongly produced.

The antennules fold obliquely. The basal antennal joint is long, rather slender, and well in contact with the front: the flagellum is long (a good deal longer than the major diameter of the orbit) and is lodged in the narrow orbital hiatus.

Anterior edge of merns of external maxillipeds almost transverse.

Chelipeds unequal in both sexes. Legs stout.

Abdomen of the male with all 7 joints distinct and separate: the last segment unusually long and acute.

60. *Polycremnus ochtodes*, (Herbst) Gerstaecker.

*Cancer ochtodes*, Herbst, Krabben, I. ii. 158, pl. viii. fig. 54: Fabricius, Ent. Syst. II. 455, and Suppl. p. 337.

*Galene ochtodes*, Adams and White, Samarang Crust. p. 43, pl. x. fig. 2.

*Polycremnus ochtodes*, Gerstaecker, Archiv. für Naturges. XXII. 1856, p. 121: A. O. Walker, Journ. Linn. Soc., Zool., XX. 1886-90, p. 110: Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 359.

Carapace oval-pentagonal, its surface smooth, a little lumpy owing to the broad shallow depressions that somewhat indistinctly separate and to a certain extent subdivide the regions.

All the borders are of about equal length: the antero-lateral is divided into four rounded deep-cut lobes, decreasing in size from behind forwards, and is continued beneath the slightly tumid lobe of the orbital angle to the angle of the buccal cavern: on the postero-lateral border just behind the junction with the antero-lateral are usually a few granules.

The front projects horizontally forward beyond the orbits and consists of two unguiform lobes separated in all their extent by a deep narrow groove: it is a distinct rostrum.

The chelipeds are unequal, most markedly so in the male. The upper border of the arm is elegantly cut into teeth or pisiform or pearl-like tubercles: two similar tubercles stand, one below the other, at the inner angle of the wrist, and the upper and outer surfaces of the wrist are more or less covered with papule-like or pustulous tubercles: the upper border of the hand, and of the basal half of the finger bears a row of pisiform tubercles, and there are numerous pustulous tubercles on the upper surface and on the proximal part of the outer surface of the hand: fingers sharp pointed.

The legs are smooth, but the upper border of the meropodites of all, or of the first three pairs, is distantly serrate or spinulous: the dactylus and the neighbouring part of the lower border of the propodite is furred.

Colours in spirit leaden grey, or yellowish with livid markings.

In the Indian Museum are 2 specimens from the Madras Coast and one from Penang.

## HALIMEDA, De Haan.

*Halimeda*, De Haan, Faun. Japon. Crust. p. 35: Dana, Amer. Journ. Sci. and Arts, (2) XII. 1851, p. 125, and U. S. Expl. Exp. Crust. pt. I. p. 149.

Closely allied to *Polycremnus*, having the same form of male abdomen.

The genus is not represented in the Indian Museum.

61. *Halimede* (?) *thurstoni*, Henderson.

*Halimede thurstoni*, Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 360, pl. xxxvi. figs. 13, 14.

It appears to me doubtful whether this is a true *Halimede*.

Alliance VI. *Galenoida*. [or Subfamily GALENINÆ].

## GALENE, De Haan.

*Galene*, De Haan, Faun. Japon. Crust. p. 19.

*Galene*, Miers, Challenger Brachyura, p. 118 (footnote.)

Carapace approaching the quadrilateral, strongly convex fore and aft, little convex from side to side; its surface granular in parts, or nearly smooth, and with the regions more or less distinctly shown by broad shallow rather vague depressions.

Antero-lateral border moderately arched, indistinctly four-lobed—the last 2 or 3 lobes in the typical species being marked by spine-like teeth: postero-lateral borders very slightly convergent, rather longer than the chord of the antero-lateral: posterior border long.

Fronto-orbital border less than half the greatest width of the carapace. Front obliquely deflexed, less than one-fifth the greatest width of the carapace in extent, bilobed or quadridentate. Orbital margin with the three grooves in the vicinity of the outer angle distinct: eyes on thick stalks of moderate length. The antennules fold nearly transversely.

Basal antennal joint broad, extremely short, not nearly reaching the front; flagellum longish (longer than the major diameter of the orbit) lodged in the broad orbital hiatus.

Anterior edge of merus of external maxillipeds a little oblique. Chelipeds massive, unequal in both sexes, fingers pointed. Legs long, stoutish.

Abdomen of male with all 7 joints separate and distinct.

No crests, delimiting efferent branchial canals, on the endostome.

62. *Galene bispinosa* (Herbst) De Haan.

*Cancer bispinosus*, Herbst, Krabben, I. ii. 144, pl. vi. fig. 45, and III. ii. 11, pl. liv. fig. 1: Fabricius, Ent. Syst. II. 446, and Suppl. p. 337.

*Cancer (Galene) bispinosus*, De Haan, Faun. Japon. Crust. p. 40, pl. v. fig. 2.

*Galene bispinosa*, A. O. Walker, Journ. Linn. Soc., Zool., XX. 1886-90, p. 110.

Carapace moderately broad, somewhat pentagonal, its surface for the greater part smooth, but usually scabrous near the borders—especially the postero-lateral borders; its surface is also somewhat lumpy,

owing to the very broad depressions which somewhat vaguely delimit and to a certain extent subdivide the regions. Pterygostomian region more or less hairy.

The antero-lateral borders are very indistinctly 4-lobed, the first lobe being almost obsolete, the second being usually marked by a granular denticle, and the third and fourth by two coarse granular spines. The postero-lateral borders, which are little convergent, are slightly longer than the chord of the antero-lateral. The posterior border is about half the greatest width of the carapace.

Front really bilobed, but with both the inner and the outer angles of each lobe so equally prominent as to appear 4-dentate.

Chelipeds unequal: exposed surfaces of arm either smooth, or more or less scabrous, both borders of arm uneven and hairy, the distal end of the upper border with two strong teeth: both the inner and the outer angles of the wrist well pronounced, or even spiniform; the exposed surfaces of the wrist may be almost smooth, but are usually studded, to a variable extent, with sharp little tubercles; the upper outer and lower surfaces of the hand may be almost smooth, but are usually studded, in the proximal third to three-quarters, with similar tubercles, in more or less distinct lines: fingers long, sharp-pointed, the apposed edges with strong molariform teeth.

Legs long, stoutish; upper border of the meropodites scabrous and spinulate, upper border of last 3 joints, and lower border of last 2, plumose.

Colours in spirit, leaden white or yellowish.

In the Indian Museum are 3 specimens from the Vizagapatam coast and 1 from Tennasserim, (besides one from Hongkong): the amount of granulation of the borders of the carapace and of the chelipeds is different in all.

## Subfamily II. ACTAEINÆ.

ACTEA, De Haan, A. Milne Edwards.

*Actea*, De Haan, Faun. Jap. Crust. p. 18.

*Actea* and *Actæodes*, Dana, U. S. Expl. Exp. Crust. pt. I. pp. 162, 194.

*Actea*, Heller, Crust. Sudl. Europ. p. 69.

*Actea*, A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, pp. 259, 260.

*Psæumis*, Keesmann, Crust. roth. Meer. p. 26.

*Actea* and *Actæodes*, Miers, Challenger Brachyura, pp. 118, 135.

Carapace convex fore and aft, slightly convex or flat from side to side, usually broad, the regions well demarcated by deep grooves, and again subdivided into lobules, which are usually convex and granular. Antero-lateral borders usually four-lobed, but the lobes are shallow and often indistinct. Postero-lateral borders usually concave, always short, not strongly convergent.

Front between a third and a fourth the greatest width of the carapace, deflexed, cleft in the middle line into two lobes. Upper edge of orbit tumid, usually with two fissures or sutures; a third below the outer orbital angle: eyestalks short and thick.

Antennules folding obliquely or nearly transversely. Basal antennal joint usually stopping at the angle of the deflexed front, but often prolonged beyond this, towards or nearly into the orbit; the flagellum is about as long as the orbit, and is lodged in the orbital hiatus.

Merus of the external maxillipeds with the anterior border little oblique.

Chelipeds equal in both sexes; fingers usually blunt-pointed, sometimes hollowed-out at tip.

Abdomen of the male five-jointed, somites 3, 4, 5 fused.

Small crabs, distinguished by the elaborate lobulation of the carapace, and by the form of the front, which is usually deep-cleft in the middle line to form two prominent round-pointed lobes.

#### Key to the Indian species of *Actæa*.

##### I. Legs of ordinary form:—

- i. The lobules of the carapace, and the legs, when granular, bear miliary or vesiculous granules of nearly uniform size, not tubercles:—

1. Length of the carapace two-thirds or less than two-thirds the breadth, postero-lateral borders extremely short and concave:—

- a. Carapace and legs covered with a short dense fur, which does not, however, conceal the lobules or their granules:—

a. Fingers hollowed at tip, fur black ... *A. tomentosa*.

β. Fingers long and pointed, fur light brown ..... *A. areolata*.

- b. Carapace and legs with numerous bristles, which do not form a coat; fingers blunt-pointed, but not appreciably hollowed at tip. *A. hirsutissima*.

2. Length of the carapace rather more than two-thirds the breadth, postero-lateral borders slightly concave:—

- a. Legs and chelipeds lobulated in the same style as the carapace:—

a. Lobules of the carapace very markedly isolated and very convex, interlobular grooves very broad and deep, and hairy ..... *A. rufopunctata*.

β. Lobules of the carapace not remarkably isolated, the grooves with a short almost invisible fur ..... *A. speciosa*.

- b. Wrist and hands sublobular, corresponding joints of legs only a little dimpled (areolation of carapace complete) ..... *A. ruppellii*.
- c. Chelipeds and legs with a plain granular surface, areolation of carapace faint anteriorly, incomplete posteriorly:—
  - a. Lobulation of antero-lateral border very indistinct, no hairs on the carapace, which is thick and convex ..... *A. obesa*.
  - β. Lobulation of antero-lateral border fairly distinct the lobules being granular; a thin coat of hair:—
    - α. Carapace of ordinary Actæa form ..... *A. pulchella*.
    - γ. Carapace more than  $\frac{1}{2}$  as long as broad; its posterior half remarkably flat..... *A. parvula*.
- ii. Carapace covered with tubercles, legs with tubercles or spines:—
  - 1. Carapace with plain isolated tubercles:—
    - a. Carapace with pearly tubercles and granules; front bilobed, but each lobe so deeply excised as to appear itself bilobed..... *A. nodulosa*.
    - b. Carapace with coarse spine-like tubercles; front broadly bilobed ..... *A. echinus*.
    - c. Carapace and chelipeds with pedicled pisi-form tubercles, legs with thorns ..... *A. peronii*.
    - d. Carapace, chelipeds and legs with pedicled, flat-topped tubercles which at the margins become petaloid; front bilobed, each lobe cut into four petaloid teeth..... *A. flosculata*.
  - 2. Carapace closely covered with confluent tubercles the surfaces of which are themselves formed of confluent granules:—
    - a. Tubercles of carapace very rough, raspberry-like, some of those on the legs often spiny: carapace about seven-ninths as long as broad. *A. granulata*.
    - b. Tubercles of carapace smooth though pitted, those of the legs never spiny: carapace about two-thirds as long as broad..... *A. calcuosa*.
- II. Propodites and carpopodites of legs dorsally bicarinate in such a way that the space between the crests appears like a trough or a series of cups:—
  - i. Propodites and carpopodites each with one trough; lobules of carapace granular; front not projecting much. *A. cavipes*.
  - ii. Carpopodites with at least two cups; lobules of carapace pitted as well as granular; front projecting far beyond the inner angle of the orbit..... *A. fossulata*.



63. *Actæa tomentosa*, (Edw.) A. Milne Edwards.

*Zozymus tomentosus*, Milne Edwards, Hist. Nat. Crust. I. 385, and in Cuvier. Règne An. Crust. pl. xi. bis, fig. 2.

*Actæa tomentosa*, A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 262, and IX. 1873, p. 191 : A. Targioni Tozzetti, "Magenta" Crost. p. 35, pl. iii. figs. 14 &c. : Hilgendorf, MB. Ak. Berl. 1878, p. 788 : Richters in Möbius Meeresf. Maurit. p. 145 : Haswell, Cat. Austral. Crust. p. 44 : Ortmann, Zool. Jahrbuch., Syst. &c., VII. 1893-94, p. 453, and in Semon's Zool. Forschung. (Jena. Denkschr. VIII) Crust. p. 50.

*Actæodes tomentosus*, Dana U. S. Expl. Exp. Crust. pt. I. p. 197 : Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 32 : Heller, SB. Ak. Wien, XLIII. 1861, p. 328, and Novara Crust. p. 17 : Miers, P. Z. S. 1877, p. 134 ; and 1879 pp. 20 and 30 ; and Phil. Trans. Vol. 168, 1879, p. 486 ; and Ann. Mag. Nat. Hist. (5) V. 1880, p. 234 ; and Zool. H. M. S. Alert, pp. 517 and 530 ; and Challenger Brachyura, p. 135 : de Man, Archiv. fur Naturges. LIII. 1887, i. p. 252 ; and in Weber's Zool. Ergeb. Niederl. Ost. Ind. II. 1892, p. 278 ; and Zool. Jahrb., Syst. &c., VIII. 1894-95, p. 499 : Cano, Boll. Soc. Nat. Napol. III. 1889, p. 199.

Carapace ovoid and very broad, its greatest length less than two-thirds its greatest breadth, its dorsal surface—like that of all the surfaces of the chelipeds and legs that are exposed in repose—covered, as closely and evenly as possible, with a dense short blackish felt through which peep the shiny tops of very numerous large vesiculous granules. This felt is not so long as to obscure the areolation of the carapace which is very perfect and in bold relief, but it obscures the fact that the deep-cut grooves that separate the lobules are smooth.

The lobules—excluding those of the antero-lateral and supra-orbital margins and those on the front—are 21 in number, the anterior 8 with the long diameter fore-and-aft, the posterior 5 with the long diameter transverse.

The front, which is vertically deflexed and does not break the wide even sweep of the antero-lateral borders, appears nearly equally four-lobed, the outer lobe on either side being formed by the tumid supra-orbital border.

The antero-lateral borders are long and beautifully arched ; when undenuded they look entire, but when denuded they are seen to be cut by narrow clefts into four very shallow lobes of unequal size,—the clefts being continued as grooves on to the under surface of the carapace. The very short postero-lateral borders are extremely concave.

The tumid supra-orbital border is cleft into lobules by two fissures similar to the grooves of the carapace, and there is a third fissure at the outer angle of the orbit.

The whole under surface of the carapace, and the surfaces of the sternum and external maxillipeds and abdominal terga, are covered with a dense felt that obscures all the granulation that exists.

The basal antennal joint is broad, and its outer angle does not fall very far short of the inner angle of the floor of the orbit.

The legs, besides the felt and the granules (which are conical rather than vesiculous) already spoken of, have their edges—but chiefly the anterior edge—fringed with coarse tufted hair: similar hair occurs on the edges of the arm.

The fingers are short, with broadly-rounded hollowed-out tips.

Colours in spirit, as in life, blackish.

In the Indian Museum are 115 specimens from the Nicobars, Andamans, Palk Str., and Laccadives (besides 31 from Mauritius, Australia and the South Sea Is.).

#### 64. *Actæa areolata*, Dana.

*Actæa areolata*, Dana, Proc. Acad. Nat. Sci. Philad. 1852, p. 73, and U. S. Expl. Exp. Crust. pt. I. p. 162, pl. viii. figs. 1a-b: A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 264: E. Nauok, Zeits. Wiss. Zool. XXXIV. 1880. p. 54 (gastric teeth): ? Miers, Zool. H. M. S. Alert, pp. 182, 209: de Man, Journ. Linn. Soc., Zool., XXII. 1887-88, p. 25: Zehntner, Rev. Suisse Zool. II. 1894, p. 147.

Carapace in proportions and outline almost exactly similar to *A. tomentosa*. Its surface and the exposed surfaces of the chelipeds and legs is also covered as densely as possible with felt; but this felt is of a lighter colour, and it almost conceals the granulation, excepting 3 or 4 lines of granulation on the lower outer surface of the hands: the felt also obscures, though it does not conceal, the areolation of the carapace, owing to the lobules being less convex.

Unlike *A. tomentosa* the upper surface of the wrist and hand are nodular (as well as granular), and the fingers are long and pointed, without any hollowing of the tip.

In other respects this species closely resembles the preceding.

One specimen from Mergui.

#### 65. *Actæa hirsutissima* (Rüppell), De Haan, Dana.

*Xantho hirsutissimus*, Rüppell, 24 Krabben roth. Meer, p. 26, pl. v. fig. 6: Milne Edwards, Hist. Nat. Crust. I. p. 389.

*Actæa hirsutissima*, De Haan, Faun. Japon. Crust. p. 18: Dana, U. S. Expl. Exp. Crust. pt. I. p. 164: Heller, SB. Ak. Wien, XLIII. 1861, p. 314; and Novara Crust. p. 9: A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 263, and IX. 1873, p. 191: Kossmann, Reise roth. Meer., Crust. p. 23: Targioni Tozzetti, Magenta Crust. p. 37, pl. iii. fig. 26: Richters in Möbius, Meeresf. Maurit. p. 145: de Man, Notes Leyden Mus. II. 1880, p. 173, and III. 1881, p. 96: Cano, Boll. Soc. Nat. Napoli, III. 1889, p. 189: Ortman, Zool. Jahrb., Syst., VII. 1893-94, p. 453.

Length of carapace =  $\frac{2}{3}$  breadth.

Carapace of much the same proportions and outline as *A. tomentosa*, but the frontal outline is more convex, and the postero-lateral borders are a little less concave.

The surface of the carapace is very completely areolated by deep smooth grooves, the lobules being exceedingly numerous, strongly convex, and closely covered with pearly granules; and between and around the bases of the granules are many short black bristles which do not form a coat or conceal the texture of the carapace.

The exposed surfaces of the chelipeds and legs are granular and bristly, like the carapace; and the carpal joints, and to a less extent the propodites are dimpled, but not distinctly nodular, above.

Under surface of carapace granular, hairy, and furrowed by grooves continued from fissures that subdivide the antero-lateral borders into four shallow lobes. The surfaces of the external maxillipeds and distal abdominal terga are bristly, those of the sternum and proximal abdominal terga are hairy.

Fingers bluntly pointed but not hollow at tip.

Colours in spirit, yellowish, fingers and greater part of hand black.

In the Indian Museum are a specimen from Samoa, a specimen without locality, and a specimen from the Andamans or Nicobars.

#### 66. *Actæa rufopunctata*, (Edw.) Heller.

*Xantho rufopunctatus*, Milne Edwards, Hist. Nat. Crust. I. 389: Lucas, Expl. Sci. Algérie, Anim. Artio. p. 11, pl. ii. fig. 1: A. Milne Edwards in Maillard's Île Réunion Annexe F, p. 4.

*Actæa rufopunctata*, A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 268, pl. xviii. figs. 1, 1a: Richters in Möbius Meeresf. Maurit. p. 145: de Man, Notes Leyden Mus. II. 1880, p. 172 and III. 1881, p. 96: Miers, P. Z. S. 1881, pp. 63, 68; and Zool. H. M. S. Alert, pp. 517, 528; and Challenger Brachyura, p. 122: Carus, Prodr. Faun. Médit. I. p. 518: R. I. Pocock, Ann. Mag. Nat. Hist. (6) V. 1890, p. 75: J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 357: Ortmann, Zool. Jahrb., Syst., VII. 1893-94, p. 454; and in Semon's Forschungen. (Jena. Denk. VIII.) Crust. p. 50.

*Actæa nodosa*, Stimpson, Ann. Lyc. Nat. Hist. N. Y. VII. 1862, p. 203; and Bull. Mus. Comp. Zool. II. 138: A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 266, pl. xvii. figs. 6-8c; and Exp. Sci. Mex., Crust. p. 245; and Bull. Mus. Comp. Zool. VIII. p. 11: Desbonne and Schramm, Crust. Guadeloupe, p. 25: J. S. Kingsley, Proc. Acad. Philad. XXXI. 1879, p. 393.

Carapace broad, ovoid, its extreme length not quite  $\frac{2}{3}$  but more than  $\frac{1}{2}$  its extreme breadth: its surface is broken, by deep and broad grooves, into numerous (about 27 excluding those round the orbits and the front) very convex lobules, which are covered very closely with large vesiculous granules; the grooves are filled with a dense short

felt—with longer hairs sometimes interspersed—against which the lobules stand out like islands. (Occasionally there are some tufts of long hair on the edge of some of the lobules).

The exposed (dorsal) surfaces of the carpal and propodal joints of the chelipeds and legs are lobulated in the same style as the carapace, the lobules being granular and being isolated by deep felted grooves.

The front is strongly deflexed, but somewhat prominent, and is rather sharply bilobed. The tumid supra-orbital margin is broken by two cross grooves, and is separated from the lower margin of the orbit by a fissure. The antero-lateral borders are cut into four rounded lobules of nearly equal size, by deepish fissures. Postero-lateral borders not appreciably shorter than the antero-lateral, and little concave.

The parts seen on the under surface are not conspicuously granular or hairy.

The basal antennal joint has its outer angle almost in contact with the inner angle of the lower edge of the orbit.

The edges of the legs (especially the upper edge) are fringed with coarse hair—as also of the arm.

The lower outer surface of the hand has the granules arranged in lines, as is the case with most species of *Actæa*. Fingers blunt-pointed, hollowed out at tip.

Colours of well-preserved spirit specimens, yellow with the convexities of some of the lobules orange-red; the felt in the grooves brown; fingers dark brown with white tips.

Five specimens from Ceylon, up to 34 fms., and four from the Andamans, up to 36 fms.

#### 67. *Actæa speciosa* (Dana), Ortmann.

*Actæodes speciosus*, Dana, U. S. Expl. Exp. Crust. pt. I. p. 198, pl. xi. figs. 4a-c: Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 32.

*Actæa speciosa*, A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 274: Ortmann, Zool. Jahrb. Syst. VII, 1893-94, p. 455.

*Actæodes nodipes*, Heller, Abhandl. zool.-bot. Ges. Wien, XI. 1861, p. 9, and SB. Ak. Wien, XLIII. 1861, p. 329, pl. ii. fig. 19, and Novara Crust. p. 17: A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 274: de Man, Notes Leyden Mus. II. 1880, p. 172.

? *Psaumis glabra*, Kossmann, Reise roth. Meer., Crust. p. 27, pl. i. fig. 4.

This species has a general resemblance to *A. rufopunctata*, but the carapace is relatively longer and narrower, its lobulation is much less complete and bold, and it is devoid of hairs.

Length of carapace =  $\frac{2}{3}$  the breadth.

Surface of carapace broken up by shallow grooves into numerous

(5) the postero-lateral borders are more concave :

(6) the dorsal surfaces of the chelipeds and legs are crisply granular, but the carpal joints show almost no dimpling and the propodal joints none at all.

In the Indian Museum are 2 specimens from the Malacca Straits and one from Bombay.

70. ? *Actæa pulchella*, A. Milne Edwards.

*Actæa pulchella*, A. Milne Edwards, Nouv. Archiv. du Mus. I. 1866, p. 273, pl. xvii. figs. 5-5b.

? *Actæodes modestus*, de Man, Archiv. für Naturges. LIII. 1887, i, p. 257, pl. ix. fig. 3.

This species, if my identification be correct, resembles *Actæa ruppellii* and *obesa*, but has the following differential characters :—

(1) the carapace is altogether less convex :

(2) the lobulation of the carapace is defective posteriorly, and is faint anteriorly owing to the fineness of the grooves :

(3) the entire surface of the carapace and dorsal surface of legs and chelipeds is covered (though not crowded) with crisp granules, most of which carry a short bristle—but these bristles are not close enough to form a coat :

(4) the antero-lateral borders are sharply granular, but their lobulation is very indistinct :

(5) except for a furrow across the wrist parallel with the articulation of the hand, the sharply granular surface of the chelipeds and legs is unbroken.

In the Indian Museum are three specimens from Mergui, the Andamans, and Ceylon.

71. *Actæa parvula*, (De Haan), de Man.

*Menippe parvulus*, De Haan, Faun. Japon. Crust. p. 21 : Krauss, Sudafr. Crust. p. 34, pl. ii. fig. 2.

*Actæa parvula*, de Man, Journ. Linn. Soc., Zool., XX. 1887-88, p. 27.

Carapace more than  $\frac{3}{4}$  as long as broad, with the posterior third or more depressed, perfectly flat, and almost or quite devoid of areolation ; its surface is everywhere covered with vesiculous granules, which become very small posteriorly, and with a fine short velvety hair : the areolation is fairly profuse and quite distinct in the anterior two-thirds.

Antero-lateral borders divided into four granular lobes : postero-lateral borders less convergent than in any other species of *Actæa*, giving the flattened posterior part of the carapace a most abnormal look

for an *Actæa*. Front deeply cleft into two round-pointed lobules. The three grooves near the outer angle of the orbit are fairly distinct.

Upper and outer surface of wrist and hand covered with pearly granules and velvet: fingers pointed, not hollowed at tip.

The exposed parts of the dorsal surface of the legs are also covered with velvet which conceals their sharply granular sculpture. Last pair of legs rather short.

Colours in spirit yellow or brownish, fingers brown.

In the Indian Museum are 3 specimens, from the Andamans and Mergui.

This species may be distinguished from all its congeners by the very moderate difference between the two diameters of the carapace, which also has its posterior part quite flat.

## 72. *Actæa cavipes*, (Dana), A. Milne Edwards.

*Actæodes cavipes*, Dana, Proc. Acad. Nat. Sci. Philad., 1852, p. 78, and U. S. Expl. Exp., Crust. pt. I. p. 199, pl. xi. figs. 5a-b.

*Actæa cavipes*, A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 280, and IX. 1873, p. 193: Ortmann, Zool. Jahrb. Syst. VII. 1893-94, p. 456, and in Semou's Zool. Forschungsgr. (Jena. Denk. VIII) Crust. p. 50.

Carapace about  $\frac{3}{4}$  as long as broad, completely lobulated, the lobules being covered with miliary granules and being separated by broad but not very deep grooves: the posterior part of the carapace sometimes has a worm-eaten appearance.

Front obliquely deflexed, with a cupid's-bow-shaped edge, hardly projecting beyond the prominent inner angle of the lower edge of the orbit. Orbital margin unfissured and unbroken. Antero-lateral borders 4, or indistinctly 5, lobed, the lobes granular and uneven, but not pitted. Postero-lateral borders very much shorter than the antero-lateral, concave.

Outer surface of wrist with numerous pits and craters, upper outer surface of hand worm-eaten.

The upper edges of the carpal and propodal joints of the legs have each a double longitudinal crest, and in every joint the ends of the crests meet so as to leave a trough-like space between them.

The basal antennal joint almost touches the inner angle of the orbit.

Fingers long, pointed, slightly hollow at tip.

In the Indian Museum are four specimens from the Andamans, Mekrân Coast, and Persian Gulf (besides specimens from Upolu and Mauritius).

73. *Actæa fossulata* (Girard) A. M. Edw.

*Cancer fossulatus*, Girard, Ann. Soc. Entom. France (3) VII. 1859, p. 149, pl. iv. figs. 2-2b.

*Actæa schmaræ*, Heller, Abh. zool.-bot. Ges. Wien, 1861, p. 6 and SB. Ak. Wien, XLIII. 1861, p. 318, pl. i. fig. 13.

*Actæa fossulata*, A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 279, and IV. 1868, p. 71: Richters in Möbius Meeresf. Maurit. p. 145.

*Psaumis fossulata*, Kossmann, Reise roth. Meer., Crust. p. 27, pl. i. fig. 3.

Closely resembles *Actæa cavipes*, but has the following difference:—

- (1) the front projects far beyond the inner angle of the orbit:
- (2) the lobes of the carapace have their convexity distinct but boundaries somewhat indistinct; and in addition to being granular, they are deeply pitted, and this gives the whole carapace a worm-eaten look:
- (3) the antero-lateral borders are four-lobed, but the first lobe is very indistinct, and the lobes are marked with rather large pits:
- (4) the upper edge of the hand is bluntly crested and the neighbouring surface is pitted rather than eroded:
- (5) the crest of the carpal joints of the legs do not only meet at their ends, but are also more or less completely joined across the middle by dissepiments, so that instead of enclosing a single trough they form at least two irregular cup-like cavities.

In the Indian Museum are two specimens from Great Coco I. (Andamans), and East I., Andamans.

74. *Actæa nodulosa*, White.

*Actæa nodulosa*, White, P. Z. S. 1847, p. 224: Ann. Mag. Nat. Hist. (2) II, 1848, p. 224; and Adams and White, Samarang Crust. p. 89, pl. viii. fig. 4: A. Milne Edwards, in Maillard's l'île Réunion, Annexe F, p. 5; and Nouv. Archiv. du Mus. I. 1865, p. 277: Miers, Challenger Brachyura, p. 120: Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 356.

Carapace  $\frac{1}{2}$  as long as broad, much subdivided by smooth well cut grooves into numerous small lobules. These lobules are rather irregularly studded with pearly tubercles and granules, the slight irregularity in size and distribution of which gives the lobules themselves a somewhat irregular look. On several of the lobules of the gastric cardiac and branchial regions are, sometimes, symmetrically disposed tussocks of long coarse whitish hair.

The obliquely deflexed front is sharply four-lobed or four-toothed, the outer lobe on either side (standing at the orbital angle) being small. The beaded supra-orbital margin is broadly fissured twice and is separated from the infra-orbital margin by a fissure. The antero-

lateral borders are sharply four-lobed, each lobe being rasp-like. The postero-lateral borders are a little concave. The posterior border is formed by a row of bead-like granules, in front of which is another row—broken in the middle—of larger beads. The sternum, and the under surface of the carapace as far as the beaded epimeral suture, are covered with vesiculous granules.

Those surfaces of the chelipeds and legs that are exposed in repose are closely and crisply granular, many of the granules being pearl-like or bead-like, and those along the dorsad border being spine-like: the edges of the legs, especially the upper edge, are hairy. The granules on lower outer surface of hand are arranged as usual in lines.

Fingers short, pointed, not hollow at tip.

The basal antennal joint falls far short of the inner angle of the floor of the orbit.

Colours in spirit, white.

In the Indian Museum are 3 specimens from off the Malabar Coast, 28–29 fms., one from the Persian Gulf, and one from the Andamans.

*Actæa nodulosa* var. *bullifera*.

In this well-marked and very ornamental variety the lobulation of the carapace—both of its surface and of its antero-lateral borders—is as deeply cut, as convex, and as regular as it is in *Actæa rufopunctata*; the tubercles are more of one size, and have a distinct constricted base and a swollen spherical pearl-like top; the front row of pearly granules of the posterior border is unbroken; the front is more bilobed with sinuous edges than four-lobed, and its edge is elegantly denticulated or beaded; and all the parts of the under surface of the body are finely granular, except the sternum, which has a pitted worm-eaten look.

Length of carapace 10 millim., breadth 14·5 millim.

A single female from the Andamans.

75. *Actæa echinus*, n. sp.

Closely resembles *Actæa nodulosa* White, but has the following difference:—

(1) instead of pearly tubercles we find coarse conical tubercles or tooth-like spines with denticulated tops; and on the chelipeds and antero-lateral borders of the carapace are coarse serrated spines:

(2) the front is broadly bilobed, the angles of the lobes being sharp:

(3) the lobulation of the antero-lateral borders is irregular and indistinct:

(4) the legs are thin and compressed, the dorsad border of the carpal and propodal joints forms a serrated crest, and the slightly



granular sculpture of the upper surfaces of these joints and of the meropodites is concealed by a close short spongy growth of hair.

Colours in spirit yellow, fingers brown.

Length of carapace 17.5 millim., breadth 26 millim.

A single male from off the Malabar Coast 29 fms.

This species (?) may perhaps be only a variety of *A. nodulosa*. I have noticed it separately, and have figured it, on account of the resemblance it bears to Herbst's *Cancer polydora* (Krabben III. ii. 33, pl. lii. fig. 2).

#### 76. *Actæa peronii*, (Edw.) Haswell.

*Xantho peronii*, Milne Edwards, Hist. Nat. Crust. I. 392: Hess, Archiv. für Naturges. XXXI. 1865, i. pp. 133, 171.

*Xantho spinosus*, Hess, Archiv. für. Nat. XXXI. 1865, pp. 132, 171: de Man, Zool. Jahrb., Syst., II. 1887, pp. 690, 692.

*Actæa peronii*, Haswell, Cat. Austral. Crust. p. 46: Miers, Challenger Brachyura, p. 122: de Man, Zool. Jahrb. Syst., II. 1887, pp. 690, 692: J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 357.

? *Chlorodius polyacanthus*, Heller, Abh. zool.-bot. Ges. Wien, 1861, p. 11; SB. Ak. Wien, XLIII. 1861, p. 339, pl. ii. fig. 21.

Carapace  $\frac{2}{3}$  as long as broad, only moderately convex, the lobulation distinct but not convex, covered with strongly convex well-isolated smooth polished tubercles, which are largest on the branchial regions and are smallest posteriorly, where also they become somewhat squamiform. On the antero-lateral borders are four (excluding a tubercle of the supra-orbital series) large tubercles, much similar to those on the branchial regions, but more prominent (almost stalked) and with larger tops (almost pisiform).

Exposed surfaces of wrist and hand covered with tubercles much like those of the branchial regions, but more prominent: on the lower outer surface of the hand they become almost squamiform: a few tubercles at the distal inner corner of the arm.

Exposed surfaces of carpal and propodal joints of legs covered with stout thorns: smaller thorns on upper edge of meropodites, and still smaller ones on surface of dactyli except on the claw.

Front broadly bilobed: each lobe with an S-shaped curve to the edge and with the outer angle pronounced.

Fingers short, blunt pointed, hardly hollow at tip.

The basal antennal joint stops far short of the inner angle of the floor of the orbit.

Colours in spirit light yellow, fingers dark brown.

In the Indian Museum are 3 specimens from Australia but none from India. It is included here on the authority of Dr. J. R. Henderson.

77. *Actæa flosculata*, n. sp.

Nearest to *Actæa acantha*, A. M. E., and *A. hystrix*, Miers.

Characterized by the close investment (carapace, chelipeds and legs) of peculiarly ornamental fungiform tubercles which become petaloid at the margins.

Carapace  $\frac{3}{4}$  as long as broad, convex; all the regions well defined by conspicuous grooves, and convex; the regions again subdivided into few convex lobules by less conspicuous grooves. The whole carapace, except the broader grooves between the regions, closely covered with very elegant tubercles which have constricted stalk-like bases and thin broad oval or kidney-shaped tops. The exposed surfaces of the chelipeds and legs are covered with ornaments similar to those on the carapace, except at the edges, where they become petaloid.

Front broadly bilobed, the edge of each lobe being deeply cut into four projecting petals. Supra-orbital margin deeply scalloped: antero-lateral borders ornamented like the surface, obscurely lobed: postero-lateral borders about equal in length to the antero-lateral, straight.

The terminal abdominal terga and the sternum of the male pitted and worm-eaten, but with a glazed appearance: under surface of carapace, as far as the epimeral suture, covered with pearly granules.

The basal antennal joint stops far short of the inner angle of the floor of the orbit.

Fingers short, blunt pointed, slightly hollow at tip.

Colours in spirit light yellow, fingers brown with white tips.

In the Indian Museum are two specimens from off Ceylon, 34 fms. and one from off Maldive Is. 28 fms. The carapace of the larger one is 8 millim. long and 12 millim. broad.

The ornamentation of this species gives it a strong resemblance to *Chlorodius fragifer* White, with which it may probably prove to be identical.

78. *Actæa granulata* (Audoin).

*Cancer granulatus*, Savigny and Audouin, Description de l'Égypte, Crust. pl. vi. fig. 2.

*Cancer savignyi*, Milne Edwards, Hist. Nat. Crust. I. 378.

*Cancer (Actæa) granulatus*, De Haan, Faun. Japon. Crust. p. 47.

*Actæa carcharias*, White, P. Z. S. 1847, p. 224, Ann. Mag. Nat. Hist. (2) II. 1848, p. 284: A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 276.

*Actæa pura*, Stimpson, Proc. Acad. Nat. Sci. Philad. 1858, p. 32.

*Actæa granulata*, A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 275, and IX. 1873, p. 192: Miers, Cat. Crust. New Zealand, p. 16; and P. Z. S. 1879, pp. 20, 80; and Challenger Brachyura, p. 120: Haswell, Cat. Austral. Crust. p. 44:

Filhol, Crust. New Zealand, p. 373 : J. R. Henderson, Trans. Linn. Soc., Zool. (2) V. 1893, p. 356 : Ortmann, Zool. Jahrb., Syst. VII. 1893-94, p. 455.

*Actæa Savignii*, Kossmann, Reise roth. Meer., Crust. p. 25 : Hilgendorf, MB. Ak. Berl. 1878, p. 787 : Cano, Boll. Soc. Nat. Napol. III. 1889, p. 189.

Carapace nearly  $\frac{1}{2}$  as long as broad, of a mulberry-like appearance, owing to its entire surface being covered with rough tubercles in the closest possible contact with one another by the base. Each individual tubercle again has a mulberry-like appearance, since it is formed of a number of facetted granules confluent by their bases.

The lobulation of the carapace is very complete, but is almost lost in the polygonal mosaic of tubercles.

The 4-lobulation of the antero-lateral borders is inconspicuous.

The postero-lateral borders are shorter than the antero-lateral, and are markedly concave.

Front sharply bilobed, the lobes projecting far beyond the well pronounced orbital angle. Orbital margin with three closed sutures.

The exposed surfaces of the chelipeds are covered with the same strong many-facetted tubercles as the carapace; but on the legs the tubercles have sharper points and are many of them spiny, especially those on the dactyli.

The abdominal terga and the greater part of the sternum are covered with a mosaic of smooth-worn tubercles: the under wall of the carapace, as far as the epimeral suture, is granular.

Fingers short, blunt pointed, hardly hollow at tip.

Basal antennal joint prolonged between front and orbit almost to the inner angle of the orbit, very much as in *Carpilius* etc.

Colour in spirit light reddish brown, fingers black with white tips: in life the colour is uniform purplish black.

In the Indian Museum are 10 specimens from the Persian Gulf, Karachi, Pedro Shoal, Ceylon, Ganjam Coast, Mergui, and Malacca (besides 14 specimens from Australia and Hongkong).

#### 79. *Actæa calculosa*, (Edw.) A. M. Edw.

*Cancer calculosus*, Milne Edwards, Hist. Nat. Crust. I. 378.

*Actæa calculosa*, A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 276, pl. xviii. figs. 3-3a : Haswell, Cat. Austral. Crust. p. 45 : J. R. Henderson, Trans. Linn. Soc., Zool. (2) V. 1893, p. 356.

Not very easily distinguishable from *Actæa granulata* at first sight, but the following difference is constant:—

(1) the carapace is shorter and broader, its length being only about two-thirds its breadth :

(2) the tubercles of the carapace and chelipeds are much smoother

and are hardly faceted, owing to the granules of which they are formed being more intimately confluent; and on the posterior part of the carapace the tubercles themselves are confluent, small, and little convex: the tubercles of the legs are never spiny:

(3) the regions and lobules of the carapace are much more distinctly delimited, and the 4-lobulation of the antero-lateral borders is more distinct.

Colours in spirit much as in *A. granulata*.

In the Indian Museum are 8 specimens from the Persian Gulf, Karachi, and Mergui.

#### *BANAREIA*, A. Milne Edwards.

*Banareia*, A. Milne Edwards, Ann. Soc. Entomol. France (4) IX. 1869, p. 168, and Nouv. Archiv. du Mus. IX. 1873, p. 193.

Strongly resembles *Actæa* in all points but has the following difference:—

(1) in the fore edge of the buccal cavern is, on either side, a deep gap, not a mere suture or fissure such as is seen in some species of *Actæa*:

(2) the fingers are compressed and extremely trenchant, resembling shears.

#### 80. *Banareia armata*, A. Milne Edwards.

*Banareia armata*, A. Milne Edwards, Ann. Soc. Ent. Fr. (4) IX. 1869, p. 168, pl. viii; and Nouv. Archiv. du Mus. IX. 1873, p. 193: Ortmann, Zool. Jahrb., Syst., VII. 1893, p. 456: de Man, Jahrb. Hamb. Wiss. Anat., XIII. (Brachyuren des Hamb. u. Paris Mus.) 1896, p. 75.

Outwardly, from the dorsal view, might almost be mistaken for *Actæa ruppellii*.

All exposed parts of the carapace and appendages, except the fingers and lower outer surface of the hand are concealed by a dark shaggy covering consisting of a dense under-fur with numerous tufts of long hair.

The carapace is a little more than  $\frac{2}{3}$  as long as broad, and when denuded, is seen to be divided into very numerous small lobules by broad smooth grooves. The lobules are convex and closely covered with pearly granules.

The front is formed of two small pointed lobes which do not break beyond the common curve of the antero-lateral borders: the supra-orbital border is fissured twice, and is separated from the lower border of the orbit by a fissure: the antero-lateral borders, when denuded, are seen to be divided into four granular lobes of unequal size, and a

(fifth) granular tubercle exists just behind the orbit: the postero-lateral borders are very distinctly concave, and are much shorter than the antero-lateral borders.

The outer surface of the wrist, when denuded, has much the same sculpture as the carapace. An oblique patch of the lower outer surface of the hand is smooth and polished and quite devoid of hair, as are the fingers except the basal half of the upper edge of the dactylus. The upper outer surface of the hand, when denuded, shows about six longitudinal lines of granules, the three upper of which are a little diffuse.

The fingers are compressed and trenchant, resembling shears: the cutting edge of the dactylus is entire, but that of the thumb has three incisiform teeth of unequal size at the base. In marked contrast to all other parts, the fingers are smooth and polished.

In the Indian Museum are 3 specimens from the Andamans.

It appears to me to be quite consistent at present to separate this species from *Actæa* while uniting *Actæodes* with that genus, for the good reason that in this case there are no known transitional forms.

#### DAIRA, De Haan.

*Daira*, De Haan, Faun. Japon. Crust. p. 18.

*Lagostoma*, Milne Edwards, Hist. Nat. Crust. I. 387.

*Daira*, Dana, U. S. Expl. Exp. Crust. pt. I. p. 202.

*Daira*, A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 297; and Miss. Sci. Mex., Crust. p. 248.

Carapace broad, strongly convex in both directions, the regions well delimited and subdivided into very numerous convex lentil-like lobules; its antero-lateral borders strongly arched, crenulate; its postero-lateral borders concave, very short.

Front deflexed, two-lobed—the lobes being conspicuous and prominent.

Orbital margin thickened and smoothly crenulate; a strong suture line in the lower margin. Eyes on short thick sub-globular stalks.

Antennules folding obliquely owing to the large size of the basal joint: interantennular septum broad.

Basal antennal joint hardly touching the front, the next joint and the very short flagellum wedged in the gap between the orbit and the front.

*Merus of the external maxillipeds with a wide and deep notch in the anterior margin.*

The chelipeds are unequal in both sexes; the fingers are blunt-pointed and hollowed-out at tip.

Upper edge of merus of chelipeds and legs crest-like and elegantly serrated, upper edge of the succeeding joints of the legs with a crest of stout sharp spines; but all this ornamentation is concealed by a broad thick fringe of long coarse hair.

Abdomen of male with all seven joints distinct, but the 3rd-5th segments are not movable on one another.

On either side of the endostome is an oblique septum defining the efferent branchial canal, but this septum extends only about half-way across the palate.

### 81. *Daira perlata*, (Herbst) De Haan.

*Cancer perlatus*, Herbst, Krabben, I. ii. 265, pl. xxi. fig. 122.

*Cancer daira*, Herbst, Krabben, III. ii. 6, pl. liii. fig. 2.

*Cancer variolosus*, Fabricius, Ent. Syst. Suppl., p. 335.

*Daira perlata*, De Haan, Faun. Japon. Crust. p. 18.

*Lagostoma perlata*, Milne Edwards, Hist. Nat. Crust. I. 387.

*Daira variolosa*, Dana, U. S. Expl. Exp. Crust. pt. I. p. 202, pl. x. figs. 4a-d.

*Daira perlata*, Stimpson, Proc. Ac. Nat. Sci. Phila. 1858, p. 32: A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 293; and IX. 1873, p. 196: Heller, Novara Crust. p. 18: Miers, Cat. Crust. New Zealand, p. 18; and Phil. Trans. Vol. 168, 1879, p. 487: Richters, in Möbius Meeresf. Maurit. p. 147: Filhol, Crust. New Zealand, p. 374: R. I. Pocock, Ann. Mag. Nat. Hist. (6) V. 1890, p. 74: Ortmann, Zool. Jahrb., Syst., VII. 1893-94, p. 474; and in Semon's Forschungsr. (Jena. Denk. VIII.) Crust. p. 52: Whitelegge, Mem. III. Austral. Mus., 1897, p. 131.

Carapace oval, strongly convex, subdivided into very numerous polished lentil and pea-shaped lobules which have their surface finely pitted. Antero-lateral borders 11 or 12-crenulate: postero-lateral borders very short, concave.

Upper and outer surface of wrist lobulated almost like the carapace; of hand and dactylus covered with coarse sharp tubercles, which become almost spiniform on the upper edge: upper part of inner surface of wrist and hand covered with a mosaic of flat markings that look like ground-down tubercles: much the same sort of mosaic occurs on the outer surface of the arm and legs, but on the dactyli and propodites of the legs the tubercles are either spiny or acute, and at the distal end of the carpus there is a spine.

Fingers short and thick, with blunt hollowed-out tips, those of the larger cheliped have the cutting-edge toothed, those of the smaller cheliped have a plain sharp cutting-edge.

Lower edge and surface of meropodites of legs much excavated in their distal half to receive the bulging distal end of the carpus in flexion.

Upper edge of legs fringed thickly with coarse long hair which

conceals their serrated and spiny sculpture. Two brushes of hair on the under surface of the dactyli.

Colours in spirit—mottled shades of warm brown.

In the Indian Museum are 11 females and 3 small males from the Laccadive reefs (besides 5 females and 1 small male from Mauritius and 2 females from Samoa).

### Subfamily III. CHLORODINÆ.

#### Alliance I. *Xanthodioida*.

#### XANTHODES, Dana.

*Xanthodes*, Dana, Proc. Acad. Nat. Sci. Philad. 1852, p. 75; and U. S. Expl. Exp. Crust. pt. I. p. 175.

*Xanthodes*, A. Milne Edwards, Ann. Sci. Nat. Zool. (4) XX. 1863, p. 227; Nouv. Archiv. du Mus. IX. 1873, p. 200; and Miss. Sci. Mex., Crust. p. 259.

*Xanthodes*, Miers, Challenger Brachyura, p. 127.

#### [Type *Xanthodes lamarckii* (Edw.)]

Carapace thick but somewhat depressed, moderately broad, somewhat hexagonal, the regions delimited and to a certain extent areolated in the anterior two-thirds.

Fronto-orbital border considerably more than half the greatest width of the carapace in extent.

Front broad (contained about  $3\frac{1}{2}$  times in the greatest width of the carapace) bilobed.

Antero-lateral border cut into four lobes or teeth. Orbital margin with the three grooves either fairly distinct, or quite indistinct.

Basal antennal joint broad and very short; the flagellum, which is rather longer than the orbit, lodged in the orbital hiatus.

Anterior edge of merus of external maxillipeds almost transverse.

Chelipeds either equal or unequal in both sexes; the arm in repose is nearly or quite hidden beneath the carapace; fingers pointed, not hollowed at tip.

Legs stoutish, more or less hairy and granular or spiny along the upper border.

Abdomen of the male five-jointed.

Of the two Indian species included in this genus, one (*Xanthodes lamarckii*) has a certain resemblance to *Lioxantho punctatus*, from which it is easily distinguished by the breadth of the fronto-orbital margin; the other (*Xanthodes notatus*) has a strong resemblance to *Phymodius sculptus*, from which it is at once distinguished by the sharp-pointed fingers, not hollow at tip.

*Key to the Indian species of Xanthodes.*

- I. Chelipeds equal, hands and wrists closely granular, outer surface of hand with three deep parallel longitudinal furrows ..... *X. lamareckii*.
- II. Chelipeds markedly unequal, hands and wrists, at any rate of the smaller cheliped, studded with sharp spine-like tubercles ..... *X. notatus*.

82. *Xanthodes lamareckii* (Edw.).

*Xantho lamareckii*, Milne Edwards, Hist. Nat. Crust. I. 391 : A. Milne Edwards, in Maillard's l'île Réunion, Annexe F, p. 4 : Heller, Novara Crust. p. 10 : Ortman, Zool. Jahrb. Syst. VII, 1893-94, pp. 444, 448.

*Xanthodes lamareckii*, A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 200, pl. vii. fig. 3 : Hilgendorf, MB. Ak. Berl. 1878, p. 789 : Miers, Zool. H. M. S. Alert, pp. 517, 529 : F. Muller, Verh. Ges. Basel, VIII. 1886, p. 474 : de Man, Archiv. für Naturges. LIII. 1897, i. p. 263 ; and in Weber's Zool. Ergebn. Niederl. Ost-Ind. II. 1892, p. 278 ; and Zool. Jahrb. Syst. VIII. 1894-95, p. 513 : Whitelegge, Mem. Austral. Mus. III. 1897, p. 130.

*Xanthodes granosomanus*, Dana, Proc. Ac. Nat. Sci. Philad. 1852, p. 75 ; and U. S. Expl. Exp. Crust. pt. I. p. 175, pl. viii. figs. 10a-c.

*Xantho granosomanus*, Heller, Novara Crust. p. 11.

The anterior and antero-lateral parts of the carapace are to a variable extent granular, the posterior part is generally quite smooth.

Fronto-orbital region marked off by a sinuous groove, gastric region well delimited and fairly distinctly divided into 3 sub-regions, branchio-hepatic regions incompletely traversed by 2 grooves proceeding from the 2nd and 3rd intervals of the antero-lateral border : no other grooves on the carapace.

Outer angle of front not very pronounced, separated from the supra-orbital margin by a faintish groove. The grooves of the orbital margin are almost indistinguishable.

Antero-lateral border divided into four broadish granular lobes, the last two of which are more acuminate (but bluntly) than the others.

Chelipeds equal in both sexes, stout, rather short (less than twice the length of the carapace) ; arm hidden beneath the carapace in repose, its anterior and posterior edges hairy, the upper part of its posterior surface granular : upper and outer surfaces of wrists and hands as closely as possible covered with pearly granules, the wrist also has a few indistinct dimples, and the outer surface of the hand is deeply scored by three parallel longitudinal furrows : fingers rather long, pointed.

Upper edge of meropodites of legs very finely serrulate : surfaces of next three joints closely granular in the vicinity of the upper (anterior)



edge: some longish hairs scattered along the upper border of the last four, and also along the ventral (posterior) borders of the last two joints.

Colours in spirit: yellowish white, fingers blackish-brown. In well preserved spirit specimens the legs are banded with bluish green, and large confluent bluish green blotches occur on the carapace.

In the Indian Museum are 15 specimens, from the Andamans, Madras coast and Ceylon, (besides 6 from parts outside India).

### 83. *Xanthodes notatus*, Dana.

*Xanthodes notatus*, Dana, Proc. Ac. Nat. Sci. Philad. 1852, p. 76, and U. S. Expl. Exp. Crust. I. p. 178, pl. viii. figs. 12a-b: A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 201: Haswell, Cat. Austral. Crust. p. 49: de Man, Archiv. f. Naturges. LIII. 1887, i. p. 264.

*Xantho notatus*, Heller, Novara Crust. p. 10.

Surface of carapace, except for the characteristic deep cut areolation, quite smooth to the naked eye. Deep well-cut grooves separate the fronto-orbital region, define the gastric region, and subdivide the branchio-hepatic regions into 3 or 4 lobules; and the gastric region is divided into 3 sub-regions by fine but well-cut lines.

Front bilobed, the outer angle of each lobe being well defined and separated from the supra-orbital margin by a notch and groove. The 3 grooves of the orbital border are distinct.

Antero-lateral border cut into 4 teeth, of which the last two are procurved and spine-like.

Chelipeds markedly unequal, the larger one more than twice the length of the carapace: the arm in both is not quite concealed by the carapace, is devoid of hair, and has the distal end of the upper border spinate: in the smaller cheliped, the upper and outer surfaces of the wrist and the upper and a large part of the outer surface of the hand are studded with sharp spine-like tubercles; but in the larger cheliped the tubercles are larger, less numerous, and are low and worn, not spine-like: the fingers are pointed, not hollowed at tip, and in the smaller cheliped are fluted, the ridges of the dactylus having a few sharpish tubercles at the basal end.

The upper edge of the meropodites of the legs is spiny, with a few long fine bristles: the upper borders of the next two joints have each two rows of spines and a good many long bristles, the carpus having also a third row of sharp granules: the dactylus is granular and bristly, and the lower edge also of the propodite has some bristles.

Colours of well-preserved spirit specimens: purplish brown, the purplish tinge very distinct on the chelipeds, the last 3 joints of the legs are greenish.

In the Indian Museum are 17 specimens, from the Andamans, Palk Str. and Ceylon.

This species has a strong likeness to *Phymodius sculptus*.

## Alliance II. *Chlorodioida*.

*Chlorodius*.

*Chlorodopsis*.

*Phymodius*.

*Cyclodius*.

### CHLORODIUS, A. Milne Edwards.

*Chlorodius*, (part) Milne Edwards, Hist. Nat. Crust. I. 399.

*Chlorodius*, (part) Dana, Silliman's Amer. Journ. Sci. and Arts (2) XII. 1851, p. 126, and U. S. Expl. Exp. Crust. pt. I. p. 204.

*Chlorodius*, A. Milne Edwards, Ann. Sci. Nat. Zool. (4) XX. 1863, p. 283; Nouv. Archiv. du Mus. IX. 1873, p. 212; Miss. Sci. Mex., Crust. p. 265.

#### [Type *Chlorodius niger* (Forsk.)]

Carapace depressed, flat, hexagonal, the regions faintly or not at all demarcated, the surface smooth and almost unbroken, except sometimes on the branchio-hepatic region, near the antero-lateral border, where there may be some broad transverse wrinkles.

Fronto-orbital border more than three-fourths the greatest breadth of the carapace. Front almost straight, faintly emarginate in the middle line, extremely broad (between a third and half the greatest breadth of the carapace), its outer angles separated from the supra-orbital margin by a groove.

Antero-lateral borders cut into four lobes or teeth, the first being in very close approximation to the angle of the orbit. Postero-lateral borders rather longer than the antero-lateral.

Orbit with two suture lines above, and one at the outer angle: eyes on short thick stalks.

Basal antennal joint large, extending upwards and outwards into the gap between the front and the orbit; the flagellum situated in the crevice-like orbital hiatus.

Merus of the external maxillipeds with the anterior border almost transverse.

Chelipeds unequal, long, more than twice the length of the carapace, half or more of the arm projecting beyond the edge of the carapace; fingers large, broadened and deeply hollowed at tip (horse-shoe shaped).

Legs never spiny, though the upper edge of the meropodites may have a few spinules distally, and that of the following joints is sharply granular.

Abdomen of the male consisting of 5 joints, the 3rd-5th somites being fused.

Key to the Indian species of *Chlorodius*.

- I. Carapace with the regions faintly marked, transversely wrinkled near the antero-lateral borders; four distinct teeth (exclusive of the orbital angle) on the antero-lateral border ..... *C. niger*.
- II. Carapace with a perfectly smooth unbroken surface; first lobe of antero-lateral margin almost obsolete, the third the most distinct of all ..... *C. laevisimus*.

84. *Chlorodius niger* (Forsk.) Rüppell, A. M. Edw.

*Cancer niger*, Forskal, Descr. Anim. p. 89.

*Chlorodius niger*, Rüppell, 24 Krabben roth. Meer. p. 20, pl. iv. fig. 7 and pl. vi. fig. 14: Milne Edwards, Hist. Nat. Crust. I. 401: Dana, U. S. Expl. Exp. Crust. pt. I. p. 216, pl. xii. figs. 5a-c: Stimpson, Proc. Ac. Nat. Sci. Phila., 1858, p. 33: Heller, SB. Ak. Wien, XLIII. 1861, i. p. 335, and Novara Crust. p. 18: A. Milne Edwards, Nouv. Archiv. du Mus. IV. 1868, p. 71, and IX. 1873, p. 214: Kossmann, Reise roth. Meer. Crust. p. 34: Miers, Ann. Mag. Nat. Hist. (5) V. 1880, p. 234; and P. Z. S. 1884, pp. 10, 11; and Zool. H. M. S. Alert, pp. 183, 215, 517, 531: de Man, Notes Leyden Mus. II. 1880, p. 174, III. 1881, p. 98, and Archiv. für Naturges. LIII. 1887, i. p. 279, and Journ. Linn. Soc., Zool., XXII. 1887-88, p. 32; and Zool. Jahrb. Syst. VIII. 1894-95, p. 519: Richters in Möbius Meeresf. Maurit. p. 147: Haswell, Cat. Austral. Crust. p. 32: J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 361: Ortman, Zool. Jahrb. Syst. VII. 1893-94, p. 465, and in Semon's Forschung. (Jena. Denk. VIII.) Crust. p. 51.

*Chlorodius hirtipes*, White, P. Z. S. 1848, p. 226; Ann. Mag. Nat. Hist. (2) II. 1848, p. 286; and Adams and White, Samarang Crust. p. 40, pl. xi. fig. 4.

*Chlorodius cytherea*, Dana, Proc. Ac. Nat. Sci. Phila. 1852, p. 79, and U. S. Expl. Exp. Crust. pt. I. p. 213, pl. xii. figs. 2a-c: Stimpson, Proc. Ac. Nat. Sci. Phila. 1858, p. 33.

*Chlorodius nebulosus*, Dana, Proc. Ac. Nat. Sci. Phila. 1852, p. 80, and U. S. Expl. Exp. Crust. pt. I. p. 214, pl. xii. fig. 3.

*Chlorodius depressus*, Heller, Abh. zool.-bot. Ges. Wien, 1861, p. 11; and SB. Ak. Wien, XLIII. 1861, p. 338: Hilgendorf in v. d. Decken's Reisen Ost-Afr. III. i. p. 74.

Carapace hexagonal, depressed: gastric region delimited by faint grooves and subdivided into from 3 to 5 indistinct areolæ by still fainter grooves; anterior part of branchio-hepatic region, just inside the antero-lateral margin, with one or two low broad transverse wrinkles: the surface of the carapace quite smooth (non-granular).

First lobe of the antero-lateral border small, almost confluent with the rounded external orbital angle; last two lobes usually ending in procurved spine-like points.

Chelipeds, in both sexes, twice or more the length of the carapace, usually quite smooth to the naked eye; a tubercle or spine on the anterior edge, and a little crenulation (not always present) on the posterior edge of the arm; inner angle of wrist strongly pronounced; fingers stout, a good deal arched, markedly spoon-like at tip.

Legs with a good deal of hair, and long fine bristles interspersed, on the dorsal aspect of the last three joints.

Colours in spirit: yellowish brown to bluish or purplish brown, sometimes mottled; fingers black.

In the Indian Museum are 64 specimens, from the Andamans, Nicobars, Mergui, and Mekraû coast, (besides 52 from other parts of the Indo-Pacific).

85. *Chlorodius lævissimus*, Dana.

*Chlorodius lævissimus*, Dana, Proc. Ac. Nat. Sci. Phila. 1852, p. 80, and U. S. Expl. Exp. Crust. pt. 1. p. 215, pl. xii. figs. 4a-g.

Carapace hexagonal, a little tumid, its surface perfectly smooth without trace of regions or areolæ.

First lobe of antero-lateral border almost obsolete, last tooth very small, the third tooth much the largest and most prominent.

Anterior edge of arm without a spine.

Last three joints of the legs with a few scattered long fine bristles—no hair.

Fingers very strongly arched, a character which—as Dana has noticed—at once distinguishes this little species from the young of *Chlorodius niger*, which it otherwise closely resembles.

Colours in spirit, white, fingers brown.

In the Indian Museum are 9 specimens, from the Andamans and Ceylon, (and 1 from Mauritius).

PHYMIDIUS, A. Milne Edwards.

*Chlorodius*, (part) Milne Edwards, Hist. Nat. Crust. I. 399: Dana. U. S. Expl. Exp. Crust. pt. I. p. 204.

*Phymodius*, A. Milne Edwards, Ann. Sci. Nat., Zool. (4) XX. 1863, p. 233; and Nouv. Archiv. du Mus. IX. 1873, p. 217; and Miss. Sci. Mex. Crust. p. 266.

*Phymodius*, Miers, Challenger Brachyura, p. 139.

Carapace moderately flat, hexagonal, all the regions well delimited, and broken up into numerous convex areolæ which have a smooth bare surface.

Fronto-orbital border not quite two-thirds the greatest breadth of the carapace. Front distinctly bilobed, with the outer angle of each lobe forming a distinct little lobule; its breadth is about a third the greatest breadth of the carapace. Orbital margin with 2 grooves above and one at the outer angle: eyes on short thick stalks.

Antero-lateral borders cut into four lobes or teeth: postero-lateral border nearly equal in length to the antero-lateral.

Basal antennal joint large, extending outwards and upwards into the gap between the front and the orbit; the flagellum situated in the orbital hiatus.

Anterior edge of merus of external maxillipeds almost transverse.

Chelipeds unequal, twice or more the length of the carapace, about half the arm projecting beyond the edge of the carapace: fingers large, strongly arched, broadened and deeply hollowed at tip.

Legs with the meropodite carpopodite and propodite sharply spinous along their upper border.

Abdomen of the male five-jointed.

*Phymodius* is distinguished from *Chlorodius* by the extensive and distinct areolation of the carapace, by the narrower front, and by the spiny armature of the dorsal border of the legs.

#### Key to the Indian species of *Phymodius*.

- I. Lobules of carapace smooth but dull; chelipeds rough with nodules or tubercles; legs with scattered hairs that do not hide the spines:—
  - i. Sculpture of carapace sharp cut; chelipeds with postule-like tubercles extending as far as fingers. *P. unguatus.*
  - ii. Sculpture of carapace worn; chelipeds with irregular nodules that do not usually reach more than halfway along the hand .. *P. monticulosus.*
- II. Lobules of carapace smooth and polished, as also are the chelipeds; legs with a stiff fringe of hair along the anterior border concealing the spines there ..... *P. sculptus.*

#### 86. *Phymodius unguatus* (Edw.) A. M. Edw.

*Chlorodius unguatus*, Milne Edwards, Hist. Nat. Crust. I. 400, pl. xvi. figs. 6–8: Dana, U. S. Expl. Exp. Crust. pt. I. p. 206, pl. xi. figs. 8a–b: Hess, Archiv. für Naturges. XXXI. 1885, pt. i. pp. 135, 171: Streets, Bull. U. S. Nat. Mus. VII. 1877, p. 105.

*Phymodius unguatus*, A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 218: Hilgendorf, MB. Ak. Berl. 1878, p. 790: Kossmann, Reise roth. Meer. Crust. p. 34: Haswell, Cat. Austral. Crust. p. 59: Miers, Challenger Brachyura, p. 139: Cano, Boll. Soc. Nat. Napol. III. 1889, p. 201: J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 362: Ortmann, Zool. Jahrb. Syst. VII. 1893–94, p. 464: de Man, Zool. Jahrb. Syst. VIII. 1894–95, p. 524.

? *Xantho de Haanii*, Krauss, Sundafr. Crust. p. 29, pl. i. fig. 2: Heller, SB. Ak. Wien, XLIII. 1861, p. 337, and Novara Crust. p. 19.

*Chlorodius areolatus*, Adams and White, Samarang Crust. p. 41, pl. xi. fig. 3.

The regions and numerous sub-regions of the carapace are all convex and sharply defined by clean-cut furrows; their surface is smooth but dull, owing to close microscopic granulation.

Front bilobed, the outer angle in each lobe forming a distinct little lobule.

The four teeth of the antero-lateral border are sharply conical.

Chelipeds unequal, but not greatly so, very finely granular; arm with the anterior border rather strongly serrated, and with numerous pustule-like tubercles along the posterior border; upper and outer surface of wrist, and upper as well as a small part of inner and a larger part of outer surface of hand, covered with well-spaced pustule-like tubercles, those on the outer surface of the hand being in longitudinal series; inner angle of wrist strongly pronounced, with bifid tip.

Legs with finely granular surface, sharply granular on the dorsal aspect, where there are some long scattered hairs: upper edge of meropodites with 1 row of spinules, upper border of carpopodites with 3 rows, of propodites with 2 rows.

Colours in spirit, yellowish brown, or greenish; fingers black.

In the Indian Museum are 12 specimens, from the Andamans and Ceylon, (as well as 19, from Mauritius and Samoa).

#### 87. *Phymodius monticulosus* (Dana), A. M. Edw.

*Chlorodius monticulosus*, Dana, Proc. Ac. Nat. Sci. Phila. 1852, p. 79; and U. S. Expl. Exp. Crust. pt. I. p. 206, pl. xi. figs. 9a-f: Stimpson, Proc. Ac. Nat. Sci. Phila. 1858, p. 34.

*Chlorodius obscurus*, Lucas in Jacquinot's Voyage Astrolabe, Zool. Vol. III. Crust. p. 26, pl. iii. fig. 4.

*Phymodius monticulosus*, A. Milne Edwards, Nouv. Archiv. du Mus. IV. 1868. p. 71 (name only): Richters in Möbius, Meeresf. Maurit. p. 148: Miers, Challenger Brachyura, p. 139: Muller, Verh. Ges. Basel, VIII. 1886, p. 474: Cano, Boll. Soc. Nat. Napoli, III. 1889, p. 201: J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 363: de Man, Zool. Jahrb., Syst. VIII. 1894-95, p. 524: T. Whitelegge, Mem. Austral. Mus. III. 1897, p. 136.

*Phymodius obscurus*, A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 220: (?) de Man, Notes Leyden Mus. II. 1880, p. 174: Richters in Möbius, Meeresf. Maurit. p. 148.

Closely resembles *P. unguatus*, but is at once distinguished by the more convex arch of the front and antero-lateral borders, by the greater dorsal convexity of the carapace, by the "worn" look of the sculpture of the carapace, and by the much less rough hands.

Carapace thick, and distinctly convex in its anterior two-thirds; the regions and subregions are all distinct and convex, but the depressions that separate them are broad and not sharp cut, and this gives the sculpture a worn or moulded appearance.

Front bilobed, the outer angle of each lobe well defined.

The four teeth of the antero-lateral margin are blunt and rounded the first two being very much worn.

Chelipeds unequal—more so than in *P. unguatus*: arm with two or three coarse denticles on the anterior border, the posterior border being rugose; upper and outer surface of wrist nodular; a certain part of the upper, as well as of the inner and (more so) of the outer surfaces of the hand nodular, but except in very young specimens, the nodules do not extend beyond, and often not so far as, halfway along the hand, so that the greater part of the hand is often smooth.

Legs as in *P. unguatus*, but the spinules are coarser and blunter.

Colours in spirit—dark chestnut brown, sometimes mottled with grey; fingers blackish brown.

In the Indian Museum is a single specimen from the Nicobars (in addition to 21 from Australia, the South Seas, and Mauritius).

#### 88. *Phymodius sculptus*, (A. Milne Edwards).

*Chlorodius sculptus*, A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 217, pl. viii. fig. 4: de Man, Notes Leyden Mus. III. 1881, p. 98; Archiv. für Naturges. LIII. 1887, i. p. 279; and Journ. Linn. Soc., Zool., XXII. 1887-88, p. 32: Ortman, Zool. Jahrb. Syst. VII. 1893-94, p. 466.

Regions of the carapace well defined and subdivided, by broad and deepish grooves, into smooth, polished, convex but flat-topped lobules: those of the branchio-hepatic regions are disposed transversely: the antero-lateral sub-regions of the gastric area are not longitudinally subdivided.

Front bilobed, the outer angles of each lobe distinct but not very prominent.

The antero-lateral border is cut into four smooth lobes and is rather shorter than the postero-lateral.

The chelipeds are unequal: the arm has several sharp teeth on the anterior border and several pearly tubercles on the distal end of the posterior border, and the inner angle of the wrist is salient; but the surface of the chelipeds is smooth and polished.

The most characteristic feature of the legs is the dense stiff fringe of long greenish-yellow bristles that clothes the anterior border of the last four joints, concealing the sharp spines with which these borders are armed.

Colours in spirit, body and legs green with brownish points, chelipeds brownish, fingers black.

In the Indian Museum are 10 specimens, from the Andamans, Mergui and Ceylon.

## CHLORODOPSIS A. Milne Edwards.

*Chlorodopsis*, A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 227.

? *Pilodius*, (part) Dana, U. S. Expl. Exp. Crust. pt. I. p. 217.

Carapace flat, more or less hexagonal, the regions well delimited and well areolated, the areolæ being granular or hairy, or both.

Fronto-orbital border about two-thirds the greatest breadth of the carapace. Front bilobed, the outer angle of each lobe usually well defined and forming a distinct little lobule; its breadth is about a third the greatest breadth of the carapace.

Antero-lateral border almost always cut into four teeth. Postero-lateral border commonly a little longer than the antero-lateral.

Orbital border with the three grooves or notches very distinct.

Basal antennal joint large, extending up between the front and the orbit, the outer angle being prolonged into the orbital hiatus.

Anterior edge of merus of external maxillipeds almost transverse.

Chelipeds either unequal or subequal, their length being generally under twice the length of the carapace; the arm short and not projecting very much beyond the carapace.

Fingers strong, arched, broadened and hollowed at tip, but not so hoof-like as *Chlorodius*.

Legs dorsally almost always hairy and spinous.

Abdomen of male 5-jointed.

*Chlorodopsis* is distinguished from *Chlorodius* and *Phymodius*, (1) by the prolongation into the orbital hiatus of the outer angle of the basal joint of the antenna, and (2) by the granular and hairy or furry carapace.

*Key to the Indian species of Chlorodopsis.*

- I. The entire carapace cut into strongly-convex, isolated areolæ, the surface of which is uniformly covered with pearly granules: the deep smooth grooves between the areolæ, and the spaces between the granules, covered with a dense, dark, extremely short fur ..... *C. areolata*.
- II. Only the anterior  $\frac{1}{3}$  to  $\frac{2}{3}$  of the carapace areolated: three or four of the lobules just inside the antero lateral border either bear spines or are themselves spine-like:—
  - i. Sculpture of carapace and legs almost concealed by bristles and long hairs:—
    1. Posterior fourth of carapace slightly concave; chelipeds rather slender, little unequal, the black colouration of the thumb hardly involves the hand at all:—
      - a. Antero-lateral margin armed with four large spines (not including the orbital angle) ..... *C. pilumnoides*.



- b. Antero-lateral margin divided into four blunt spinuliferous lobes ..... *C. nigrocrinita*.
2. Posterior fourth of carapace flat; the antero-lateral margin consists of four lobes each capped by several spinules: chelipeds markedly unequal, the black colouration of the thumb involves the greater part of the lower surface of the hand ..... *C. melanochira*.
- ii. Carapace with a few scattered hairs which do not in the least conceal its sculpture. The groove that cuts off the fronto-orbital margin from the rest of the carapace is very distinct:—
1. All four spines of the antero-lateral margin equal, the 2nd and 3rd commonly with an accessory spinule near the tip ..... *C. wood-masoni*.
2. First spine of the antero-lateral margin small or obsolescent; last three spines large, claw-like ..... *C. spinipes*.

89. *Chlorodopsis areolata*, (Edw.) A. M. Edw.

*Chlorodius areolatus*, Milne Edwards, Hist. Nat. Crust. I. 400: Hess, Archiv. für Naturges. XXXI. 1865, pp. 135, 171.

*Chlorodius perlatus*, Macleay, Ill. Zool. S. Afr., Annulosa, p. 59: Krause, Sudafr. Crust. p. 31.

*Chlorodopsis areolata*, A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 231, pl. viii. fig. 8: Hilgendorf, MB. Ak. Berl. 1878, p. 790: Richters in Möbius. Meeresf. Maurit. p. 148: Haaswell, Cat. Austral. Crust. p. 54: Miers, Zool. H. M. S. Alert, pp. 517, 532: F. Muller. Verh. Ges. Basel, VII. 1886, p. 474: de Man, Notes Leyden Mus. XII. 1890, p. 54: Ortmann, Zool. Jahrb. VII. 1893-94, p. 470.

Carapace flat, but thick, as completely lobulated as any *Actæa*; the lobules strongly convex, isolated by broad deep smooth channels, their convexities as closely as possible covered with pearly granules, the dividing channels lined by an extremely short dense dark fur, which also extends between but does not cover the granules of the lobules.

The front is deeply and broadly cut into two granular lobes, the outer angle of each of which forms a separate lobule. The three fissures of the orbital margin are so deep as to give a lobed appearance.

The antero-lateral border is divided by broad notches into four rounded granular lobes.

Chelipeds unequal, the longer one about twice the length of the carapace; the upper part of the outer surface of the arm, the nodular or wrinkled surface of the wrist, and the upper and outer surface of the hand are all closely covered with pearly granules, which are largest on the hand: fingers strongly arched, smooth except for some grooving and granulation at base of dactylus.

The exposed surface of the legs is as closely as possible covered with a dense spongy fur from which the tops of numerous conical or subspinous granules peep out: the dorsal edge of the legs is also clothed with a thick shaggy fringe of hair, as also the ventrad edge of the last two joints.

Colours in spirit yellowish brown to blackish brown; fingers black, the colouration extending along the lower border and on to both surfaces of the hand.

In the Indian Museum are 19 specimens, from the Andamans, Nicobars and Ceylon (in addition to 12 specimens from the South Seas and Mauritius).

#### 90. *Chlorodopsis pilumnoides*, (White).

*Chlorodius pilumnoides*, White, P. Z. S. 1847, p. 226; Ann. Mag. Nat. Hist. (2) II. 1848, p. 286; Adams and White, Samarang Crust. p. 41, pl. ix. fig. 3.  
 ? ? *Pilodius pilumnoides*, Dana, U. S. Expl. Exp. Crust. pt. I. p. 221, pl. xii. fig. 10a-c.

*Chlorodopsis pilumnoides*, de Man, Journ. Linn. Soc., Zool., XXII. 1887-88, p. 34, Archiv. für Naturges. LIII. 1887, i. p. 281; Cano, Boll. Soc. Nat. Napol. III. 1889, p. 204; Ortmann, Zool. Jahrb. VII. 1893-94, p. 470.

Carapace, chelipeds and legs granular, beneath a copious covering of short black bristles among which are scattered numerous long white club-shaped hairs.

Carapace flat, its regions, in the anterior two-thirds, plainly marked and subdivided by broadish shallow furrows, but not convex; its posterior third flat, or even a little concave, between two raised transverse beaded lines.

Front cut rather deeply into two granular or denticulate lobes, the outer angle of each of which forms a little lobule. The three fissures of the granular orbital margin are distinct.

On the antero-lateral margin are four red-tipped claw-like spines not including the orbital angle, the middle two, at least, of which have a pair of spinelets at base: on the carapace just inside either antero-lateral margin is a scattered group of 5 or 6 similar, but rather smaller, spines.

Chelipeds subequal, rather slender, not longer than the legs (less than twice the length of the carapace); both edges of the upper surface of the arm spinulate; numerous spines on the wrist, the one (or two) at the inner angle the largest; rows of spines along upper surface, rows of sharp granules along lower part of outer surface, of hand; fingers strongly fluted, the ridges being sharply and elegantly serrate or spinate.

In the legs, all the edges of the meropodites are more or less spinate and the carpopodites and propodites are dorsally more or less spinulate.

Colours in spirit: yellowish, or mottled green; legs yellowish with purplish-brown cross-bands, or light green with dark green cross-bands; fingers black, the colouration not extending along the hand.

In the Indian Museum are 7 specimens from the Andamans and 1 from Mergui.

91. ? *Chlorodopsis nigrocrinita*, (Stimpson).

? *Pilodius nigrocrinitus*, Stimpson, Proc. Acad. Nat. Sci. Philad. 1858, p. 34.

Differs from *C. pilumnoides* in having the antero-lateral margin cut into 4 blunt lobes which when denuded and examined under a lens are spinuliferous: only the distal end of the upper edge of the arm is spinulate.

Four specimens from the Andamans are in the Indian Museum.

It is at once distinguished from *C. melanochira*, to which it also bears a strong resemblance, by the altogether different form of the chelipeds and fingers. The chelipeds, like those of *C. pilumnoides*, are slender and of equal size, and the black colouration of the fingers does not extend on to the hand.

92. *Chlorodopsis melanochira*, A. M. Edw.

*Chlorodopsis melanochira*, A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 228, pl. viii. fig. 5: Haswell, Cat. Austral. Crust. p. 55: de Man, Archiv. für Naturges. LIII. 1887. i. p. 281, and in Weber's Zool. Ergebn. Niederl. Ost-Ind. II. 1892, p. 278; and Zool. Jahrb. Syst. VIII. 1894-95, p. 520: Ortmann, Zool. Jahrb. Syst. VII. 1893-94, p. 471.

Carapace, chelipeds and legs covered with short black bristles and long yellow hairs, the yellow hairs being sparse on the carapace but exceedingly long and numerous on the legs, and the bristles being embedded each in a curious little white ball of felt.

On the denuded carapace the regions are all well defined and well areolated by well-cut smooth grooves, the convexities of the areolæ being granular: the posterior third or fourth of the carapace forms a flat granular surface.

Front cut into two elegantly denticulated lobes, the outer angle of each of which forms an independent lobule. The three fissures of the finely denticulate orbital margin are distinct.

The antero-lateral margin is divided into four lobes, each of which is crowned with several spinules: two or three of the lobules of the carapace just inside either antero-lateral margin are capped with similar spinules.

The chelipeds are markedly unequal, the larger one being less than twice the length of the carapace. The anterior and posterior edges of the arm are granular; the wrist has the upper and outer surfaces studded with granules and conical spine-like tubercles; similar tubercles and pearly granules stud the upper and more or less of the outer surface of the hand; the finger has a few spinule-like tubercles at base.

The legs have the upper border of the meropodite, carpus, and propodite denticulate.

Colours in spirit; brownish yellow or mottled green, the mottling on the legs forming indistinct cross-bands; fingers black, the colouration involving the greater part of the lower border and both surfaces of the lower outer corner of the hand.

In the Indian Museum are 35 specimens from the Andamans.

This species is at once distinguished from *C. pilumnoides*, (1) by the smaller size, (2) by the better defined areolation of the carapace, (3) by the cap of spinelets—instead of a large claw-like spine—on each of the 4 lobes of the antero-lateral margin, (4) by the marked inequality of the chelipeds, and (5) by the black colouration of the thumb extending far back along the hand.

93. *Chlorodopsis spinipes* (Heller) A. M. Edw.

*Pilodius spinipes*, Heller, Abh. zool.-bot. Ges. Wien, 1861, p. 11, and SB. Ak. Wien, XLIII. 1861, i. p. 340, pl. ii. fig. 22.

*Chlorodopsis spinipes*, A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 230, pl. viii. fig. 6: de Man, Notes Leyden Mus. III. 1881, p. 98; Archiv. für Naturges. LIII. 1887, i. p. 282; and in Weber's Zool. Ergebn. Niederl. Ost-Ind. II. 1892, p. 278; J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 361; Ortmann, Zool. Jahrb. VII. 1893-94, p. 471.

Carapace and chelipeds with a few scattered hairs, legs with numerous long stiff brown and yellow hairs that a good deal conceal the sculpture.

The regions and subregions of the carapace in its anterior  $\frac{3}{4}$  are most remarkably well defined by broad smooth deep-cut grooves, and are coarsely and unevenly granular.

The front is cut into two lobes which have their free edge entire or slightly crenulate, and their outer angle isolated and spine-like. The orbital margin is sharp-cut and almost smooth: the 3 fissures are distinct.

The antero-lateral margin is cut into four teeth, of which the first is always small and often obsolescent, while the other three are large, procurved and claw-like. The three or four lobules of the carapace just inside and parallel with the antero-lateral border have the form of salient conical tubercles.

The chelipeds are unequal, the larger one being not quite twice the length of the carapace: the arm has 2 or 3 spines at the distal end of the anterior and posterior borders; the upper and outer surfaces of the wrist and hand are covered with sharp spine-like tubercles which become blunt and pearl-like in the lower part of the hand, and one or two of the spines at the inner angle of the wrist are enlarged; fingers with some sharp tubercles at base.

Legs with numerous long sharp spines (which are a good deal concealed by long stiff hairs) along the upper border,—a single series on the meropodites, 2 or 3 series on the carpopodites and propodites.

Colours in spirit: yellowish or greenish brown, somewhat mottled on the carapace and somewhat banded on the legs; fingers black, the colouration not extending to the hand.

In the Indian Museum are 20 specimens, from the Andamans and Mergui.

This species is suspiciously like the *Pilodius pugil* of Dana.

#### 94. *Chlorodopsis wood-masoni*, n. sp.

Carapace with a few rather long scattered hairs, legs with similar but more numerous hairs, not in any way concealing the sculpture, chelipeds almost free from hairs.

The carapace is thick, and has the regions and subregions well defined, in its anterior  $\frac{1}{4}$ , by broad smooth grooves, and coarsely and unevenly granular.

The front is cut into two sharply denticulate lobes, the outer angle of each of which is very distinctly isolated and spine-like. The orbital margin is denticulate and has the three fissures distinct.

The antero-lateral margin has four large procurved spines, some of which (almost constantly the second one) may have an accessory spinule near the tip. Three or four of the lobules just inside either antero-lateral margin bear each a somewhat similar spine.

The outer angle of the basal antennal joint is prolonged into the orbital hiatus.

The chelipeds are unequal, the larger one being not quite twice the length of the carapace. The arm has one or two spine-like teeth at the distal end of both the anterior and the posterior border; the wrist is studded with spine-like tubercles and has a pair of strongish spines at the inner angle; the hand has spine-like tubercles along the upper surface, and close-set pearly granules along the outer and lower surfaces; fingers with spine-like denticles at base only.

Meropodites of legs with the upper border spinulate; carpopodites

and propodites each with two or three rows of spinules and sharp granules.

Colours in spirit—yellowish or reddish brown; fingers black, the colouration stopping sharply at the base of the thumb.

Carapace 8 millim. long, 13 millim. broad.

In the Indian Museum are 19 specimens from the Andamans.

This species is very closely related to *C. melanodactylus*, A. M. Edw. (of which we have in the Museum specimens from Samoa) but differs in having (1) only a few scattered hairs on the carapace, (2) the front deeply bifid and elegantly denticulate, with the outer angle isolated and spine-like, (3) the sculpture of the carapace much sharper and bolder, (4) the pearly granules and spine-like tubercles of the chelipeds more numerous and close-set.

From *C. spinipes* it differs in having (1) the front sharply spinulate, (2) the first spine of the antero-lateral border almost as large and well spaced as the other three, the 2nd and 3rd spines moreover having almost always an accessory spinule near the tip, (3) the spines of the legs not so large and acicular and not so much concealed by hairs.

It may very possibly be the *Pilodius scabriculus* of Dana.

#### Sub-genus CYCLODIUS, Dana.

*Cyclodius*, Dana, Silliman's Amer. Journ. Sci. and Arts, (2) XII. 1851, p. 126; and U. S. Expl. Exp. Crust. pt. 1. p. 222.

*Cyclodius* agrees in every particular with *Chlorodopsis*, excepting only that the carapace is longer and narrower, being, in fact, almost as much sub-circular as hexagonal.

In general form, as in the relations of the basal antennal joint, *Cyclodius* much resembles *Etisodes*, from which, however, the form and breadth of the front at once distinguishes *Cyclodius*.

#### 95. *Chlorodopsis* (*Cyclodius*) *ornata*, Dana.

*Cyclodius ornatus*, Dana, Proc. Acad. Nat. Sci. Philad. VI. 1852, p. 80; and U. S. Expl. Exp. Crust. pt. I. p. 223, pl. xii. figs. 11a-g.

Carapace flattish, about  $\frac{2}{3}$  as long as broad, almost as much sub-circular as hexagonal, its regions and subregions delimited by well cut grooves, the subregions being numerous and having a microscopically granular surface.

Front a little more than half the greatest breadth of the carapace, bilobed, the outer angle of each lobe well pronounced. Orbital margin with two grooves above and one at the outer angle.

Antero-lateral margin cut into four teeth (exclusive of the orbital angle) the last three of which are procurved and claw-like.

Basal antennal joint prolonged into the orbital hiatus—and filling it—on the same extensive scale as in *Chlorodopsis areolata*.

Chelipeds very little unequal, not much longer and stouter than the legs, about  $1\frac{3}{4}$  times the length of the carapace: arm with several spinules along the posterior border and two large ones on the anterior border; wrist and hand with numerous sharp spine-like tubercles, which fall into longitudinal series on the outer surface of the hand; fingers with some coarse spinules at base, rather strongly arched, broadened and hollowed at tip.

Legs granular, somewhat furred, the upper border of the meropodites carpopodites and propodites spinuate.

The grooving of the under surface of the carapace, found in all the species of *Chlorodius*, *Chlorodopsis*, &c., is particularly elegant.

In the Indian Museum is a male from the Andamans (and one from Mauritius).

### Alliance III. *Cymoida*.

#### CYMO, De Haan.

*Cymo*, De Haan, Faun. Japon. Crust. p. 22.

*Cymo*, Dana, Amer. Journ. Sci. and Arts. (2) XII. 1851, p. 126; and U. S. Expl. Exp. Crust. pt. I. p. 224.

Carapace about as long as broad, subcircular, or less commonly elongate-pentagonal; not, or little, convex; depressed, with regions and subregions faintly or not at all shown.

Fronto-orbital border from about  $\frac{2}{3}$  to  $\frac{3}{4}$  the greatest breadth of the carapace in extent. Front from about  $\frac{1}{2}$  to about  $\frac{1}{3}$  this measure, horizontal, bilobed, with the outer angle of each lobe prominent and separated from the supra-orbital margin by a notch and groove. The grooves of the orbital margin are either indistinguishable or distinct. Eyes on short thick stalks.

The antennules fold obliquely. The basal joint of the antennæ has its outer angle produced into the orbital hiatus, and the flagellum, which is short, is situated between this process of the basal joint and the front.

The chelipeds are remarkably unequal in both sexes, the larger cheliped, in adults, being more than half again as long and more than twice as massive as the smaller: the fingers of the larger cheliped are short, thick, blunt-pointed (beak-like) and hollowed at tip; those of the smaller hand, though also hollowed-out, are long and slender.

The legs are invested and fringed with a thick shaggy fur that entirely conceals their sculpture: they are short and massive.

The abdomen of the male consists of five joints, the 3rd-5th somites being fused.

The species of this genus are at once recognized by the subcircular carapace, which even in the male leaves the first two and part of the third abdominal terga exposed in a dorsal view; and by the remarkable inequality and dissimilarity of the chelipeds.

*Key to the species of Cymo.*

- I. Carapace subcircular, depressed, but not quite flat:—
  - i. Wrists and hands studded with sharpish granules only: front bilobed, the edge of each lobe denticulate:—
    1. Fingers white..... *C. andreossyi.*
    2. Fingers black except at tip..... *C. melanodactylus*
  - ii. Wrists and hands with large granular warts as well as granules:—
    1. Front bilobed, the edge of each lobe concave and the angles in the form of granular tubercles, so that the front appears four-lobed..... *C. quadrilobatus.*
    - [2. Front not four-lobed..... *C. tuberculatus.*]
- II. Carapace more elongate-pentagonal than subcircular, perfectly flat..... *C. deplanatus.*

96. *Cymo andreossyi*, (Audouin) De Haan.

*Pilumnus? andreossyi*, Audouin on Savigny's Desc. de l'Egypte, pl. v. fig. 5, p. 86.

*Cymo andreossyi*, De Haan, Faun. Japon. Crust. p. 22: Dana, U. S. Expl. Exp. Crust. pt. I. p. 225, pl. xiii. figs. 2 a-b: Stimpson, Proc. Ac. Nat. Sci. Phila. 1858, p. 34: Heller, SB. Ak. Wien, XLIII. 1861, p. 346, and Novara Crust. p. 20: A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 252: Kossmann, Reise roth. Meer. Crust. p. 35: Miers, Phil. Trans. Vol. 168, 1879, p. 487, and Zool. H. M. S. Alert. pp. 517, 522: de Man, Archiv. fur Naturges. LIII. 1887, i. p. 291: J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 363: Ortmann, Zool. Jahrb. Syst. VII. 1893-94, p. 443.

Carapace almost circular, its greatest length being inappreciably less than its greatest breadth, closely covered with a spongy fur on removal of which can be seen (1) faint depressions demarcating the gastric and cardiac regions and incompletely separating the gastric region into three sub-regions, others subdividing the branchio-hepatic regions into faintly convex areolæ, and (2) a few granules on the anterior part of the gastric region (in a transverse line) and on some of the lobules of the branchio-hepatic regions.

Front rather more than  $\frac{1}{2}$  the greatest breadth of the carapace in extent, bilobed, separated from the dentiform supra-orbital angle by a



groove, its free edge irregularly denticulate. Orbital margin entire. Lateral borders of the carapace somewhat granular.

Chelipeds markedly unequal, covered with fur, but not so much as to entirely conceal their sculpture. The arm has both borders fringed with fur and the distal corner of the upper surface granular; the upper and outer surfaces of the wrist are studded with sharpish granules, as are the upper, outer and part of the inner surfaces of the hands and the basal half of the finger — those towards the upper part of the hand having a linear arrangement. The fingers of the larger cheliped are stout, truncated, blunt-pointed and strongly hollowed at tip; those of the smaller cheliped, though also hollowed, are thin, slender and pointed.

The legs are covered with a thick shaggy coat of fur, which is specially long and adherent along the borders. When this is removed the upper edge of the meropodites is finely granular, and the upper borders of the following joints are traversed by several rows of sharpish granules.

Colours in spirit, brownish yellow or fawn-colour, fingers white.

In the Indian Museum are 11 specimens, from Mekran coast, Ceylon, Andamans and Nicobars (besides 11 from other parts of the Indo-Pacific).

#### 97. *Cymo melanodactylus*, De Haan.

*Cymo melanodactylus*, De Haan, Faun. Japon. Crust. p. 22: Dana, U. S. Expl. Exp. Crust. pt. I. p. 225, pl. xiii. fig. 1: Stimpson, Proc. Acad. Nat. Sci. Philad. 1858, p. 34: A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 252: Ortmann, Zool. Jahrb. Syst. VII. 1893-94, p. 442.

*Cymo andreossyi* var. *melanodactylus*, Miers, Zool. H. M. S. Alert, p. 533 de Man, Journ. Linn. Soc. Zool. XXII. 1887-88, p. 35.

Differs from *C. andreossyi* in the following particulars:—

(1) the carapace is more lumpy; (2) the anterior half of the lateral borders shows more distinct indications of three lobules, some of which may even bear a spinelet; (3) the fingers are black, except at tip.

In the Indian Museum are 8 specimens, from the Andamans, Mergui and Ceylon, (besides 2 from other parts of the Indo-Pacific.)

#### 98. ? *Cymo deplanatus*, A. Milne Edwards.

? *Cymo deplanatus*, A. Milne Edwards, Journ. Mus. Godeffr. I. 1873, p. 257.

This species, if I am correct in my identification, differs from *Cymo andreossyi* only in the following particulars:—

The carapace is less subcircular and more elongate-pentagonal;  
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it is as flat as a coin and is either quite smooth or has only a transverse row of granules in the anterior part of the gastric region: the somewhat pentagonal outline is due to the antero-lateral borders being convergent from a distinct, though obtuse, angle of union with the postero-lateral.

99. *Cymo quadrilobatus*, Miers.

*Cymo quadrilobatus* Miers, Zool. H. M. S. Alert, p. 533.

General form as of *O. andreossyi*.

The carapace is covered with a fine close down which does not, however, in the least conceal its sculpture.

On either side of the carapace just behind the front are two granular transverse elevations (= Dana's areolæ 2 F and 1 M): the branchio-hepatic regions are distinctly areolated, the areolæ having the form of elevated clusters of pearly granules.

The front is really bilobed, but as each lobe has a deeply concave edge and both angles surmounted by a granular tubercle, it appears four-lobed.

The three grooves near the outer angle of the (beaded or crenulate and somewhat tumid) orbital margin are very distinct. The anterior half of the lateral margin of the carapace is divided into three granular lobes.

The chelipeds have the same general form and proportions as in *O. andreossyi*: they are more or less invested with a fine down, which does not conceal their sculpture: the upper surface of the arm is covered with pearly granules: the upper and outer surfaces of the wrist, and the upper, outer and much of the inner surfaces of the hands, are covered with pearly granules, many of which, on the wrist and in lines along the upper surface of the hand, unite to form large wart-like tubercles: the fingers of the larger cheliped are stout, truncated, blunt pointed and somewhat hollowed at tip; those of the smaller cheliped, though hollowed, are thin and pointed.

The legs are thickly covered with fur and long adherent silky hairs, beneath which the whole dorsal surface of the last four joints is granular.

Colours in spirit: light yellow, with either livid or rich chestnut brown mottled markings on the carapace: fingers of the larger hand whitish, usually with a black base, those of the smaller hand black with white tips; in both cases the distal half of the lower border of the hand is black.

Carapace of largest specimen in the Indian Museum collection 15.5 millim. long, 16 millim. broad.

In the Indian Museum are 5 specimens, from Palk Straits, 5-7 fms., and off Little Andaman 12 fms.

100. *Cymo tuberculatus*, Ortmann.

*Cymo tuberculatus*, Ortmann, Zool. Jahrb. Syst. VII. 1893-94, p. 443.

This species, from the Maldivé Islands, resembles *C. quadrilobatus* in the characteristic sculpture of the chelipeds, and may perhaps be identical with Miers' species.

It is not represented in the Indian Museum.

Section II. *Hyperomerista*.

The efferent branchial channels are defined by a ridge on either side of the palate, the ridges extending right up to the epistomial edge.

Sub-family IV. MENIPPINÆ.

Carapace broad, transversely oval; front a fourth, or less than a fourth the greatest breadth of the carapace. The basal antennal joint does not nearly reach the front. The abdomen of the male has all 7 segments distinct and separate.

Alliance I. MENIPPIOIDA. Carapace convex, its antero-lateral borders longer than the postero-lateral: ridges of the endostome faint.

Alliance II. PSEUDOZIOIDA. Carapace flat, its antero-lateral borders shorter than the postero-lateral: ridges of the endostome strong and sharp.

Sub-family V. OZINÆ.

Carapace broad, transversely oval; front broad, about a third the greatest breadth of the carapace. The basal antennal joint is broadly in contact with the front. All 7 segments of male abdomen distinct and separate. The efferent branchial channels very distinct and circumscribed.

Alliance I. OZIOIDA. The orbital hiatus is open and is occupied by the antennary flagellum.

Alliance II. RUPPELLIOIDA. The orbit is a completely closed cavity.

Sub-family VI. PILUMNINÆ.

Carapace moderately broad; front about a third the greatest breadth of the carapace: the antero-lateral borders of the carapace

are not longer than, and are often shorter than, the postero-lateral. The basal antennal joint does not touch, or only just touches, the front.

Alliance I. *PILUMNOIDA*. Carapace commonly densely tomentose, its regions commonly well defined and areolated.

Alliance II. *HETEROPANOPIOIDA*. Carapace smooth, its regions either not at all, or not very well defined.

#### Sub-family VII. *ERIPHIINÆ*.

Carapace sub-quadrilateral, the antero-lateral borders not forming an arch but meeting the postero-lateral borders at a very open and inconspicuous angle. Front very broad, half or more the greatest width of the carapace, and, with the orbits, occupying the whole anterior border of the carapace. Basal antennal joint not touching the front. Abdomen of the male either with all 7 segments distinct or with the 3rd, 4th and 5th fused.

Alliance I. *ERIPHIODA*. The gastric region, at least, is well defined: basal antennal joint short and thick: orbits deep: arms stout and short.

Alliance II. *TRAPEZIOIDA*. Carapace perfectly smooth, without trace of regions: basal antennal joint slender: orbits shallow, affording little concealment to the eyes: arms long or very long, projecting in large part or entirely beyond the carapace, in repose.

Alliance III. *DOMECIOIDA*. No trace of regions; orbits shallow; arms short; legs, chelipeds, and frontal and antero-lateral borders of carapace strongly spinate. Merus of external maxillipeds more than twice as broad as long.

Alliance IV. *MELIOIDA*. Carapace hexagonal, the regions either absent or fairly well defined; basal antennal joint slender; orbits shallow. The chelipeds are very much shorter and slenderer than the legs.

#### Subfamily IV. *MENIPPINÆ*.

##### Alliance I. *Menippioida*.

*Menippe*.                      *Myomenippe*.

##### *MENIPPE*, De Haan.

*Menippe*, De Haan, Faun. Japon. Crust. p. 21.

*Pseudocarcinus*, Milne Edwards, Hist. Nat. Crust. I. 407.

*Menippe*, A. Milne Edwards, Ann. Sci. Nat., Zool., (4) XX. 1863, p. 280; and Exp. Sci. Mex. Crust. p. 262.

Carapace broad, transversely oval, moderately convex fore and aft,

very slightly so from side to side; the regions, except the gastric, little defined.

Antero-lateral borders long, strongly arched, cut into four teeth; postero-lateral borders slightly shorter than antero-lateral, convergent; posterior border short.

Front narrow, less than a fifth the greatest breadth of the carapace, rather prominent, almost horizontal, cut into two prominent lobes, the outer angle of each of which forms a distinct tooth.

Orbit with the three grooves near the outer angle well marked: inner orbital angles—both upper and lower—well pronounced. Eyes on short thick stalks.

The side edges of the front are not turned down and the short basal antennal joint does not nearly reach the front, so that the cavities of the orbits and antennules are not properly separated: the next antennal joint just reaches the front, and the long antennary flagellum stands in the orbital hiatus. The antennules fold nearly transversely.

The anterior edge of the merus of the external maxillipeds is oblique and a little sinuous but not excised.

The ridges of the endostome, defining the expiratory channels, are complete, but low and faint.

Chelipeds massive, a little unequal in both sexes; fingers stout, pointed, not hollowed.

Abdomen of male singularly broad, all seven segments distinct.

#### 101. *Menippe rumphii*, Fabr., v. Martens.

*Cancer rumphii*, Fabr., Eut. Syst. Suppl. p. 336: Herbst, Krabben, III. i. 63, pl. xlix. fig. 2.

*Menippe rumphii*, v. Martens, Archiv. für Naturges. XXXVIII. 1872, p. 88: de Man, Journ. Linn. Soc., Zool., XXII. 1887-88, p. 36: Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 363.

*Pseudocarcinus bellangeri*, Milne Edwards, Hist. Nat. Crust. I. 409, pl. xiv bis, fig. 15.

*Menippe bellangeri*, Heller, Novara Crust. p. 15: Muller, Verh. Ges. Basel, VIII. 1886, p. 474.

Gastric region distinct and fairly distinctly subdivided into three lobes; between it and the front are four pimple-like tubercles standing in a square. Two low indistinct somewhat granular elevations, nearly parallel with the curve of the antero-lateral border, traverse either branchial region; the first, which is the more distinct, can generally be traced across the gastric region also. The surface of the carapace is finely pitted antero-laterally, but elsewhere is smooth.

The front, which is not quite a fifth the greatest breadth of the carapace, consists of two prominent round-pointed lobes, outside of

each of which is a prominent rounded tooth separated from the supra-orbital margin by a groove.

The antero-lateral border is fairly sharp and is divided into four broad lobes, of which the last two are distinctly, the first two indistinctly, acuminate.

Chelipeds massive, a little unequal, smooth with some fine and distant pitting: inner angle of wrist bluntly prominent; fingers stout, rather short.

Legs stout, smooth, except the upper border which is sometimes microscopically granular: upper border of carpopodites sparsely, both borders of propodites and dactyli more thickly, hairy.

Colours in spirit reddish or brownish yellow with sometimes a fine network of darker markings; fingers black.

In the Indian Museum are 100 specimens, from Penang, Tavoy, Mergui, Madras coast, Ceylon, Laccadives, Karáchi and Persiau Gulf.

#### Subgenus MYOMENIPPE, Hilgendorf.

*Myomenippe*, Hilgendorf, MB. Ak. Berl. 1878, p. 795.

Closely resembles *Menippe* in all respects, but differs (1) in the orbit being a completely closed cavity, owing to the contact of its upper and lower inner angles; hence the long antennary flagellum is quite excluded from the orbit, and (2) in the front being rather broader (nearly a fourth the greatest breadth of the carapace) and six-lobulate.

#### 102. *Menippe* (*Myomenippe*) *granulosa*, A. M. Edw.

*Menippe granulosa*, A. Milne Edwards, Ann. Soc. Ent. Fr. (4) VII. 1867, p. 275.

*Myomenippe duplicidens*, Hilgendorf MB. Ak. Berl. 1878, p. 796, (*fide* de Man.)

*Myomenippe granulosa*, de Man, Journ. Linn. Soc. Zool., XXII. 1887-88, p. 40, pl. ii. fig. 1; and Zool. Jahrb., Syst., VIII. 1894-95, p. 525.

The gastric region is fairly well demarcated and subdivided into three areas, the two antero-lateral of which have the surface broken up into low granular convexities: the lateral regions of the carapace are also rugose, the wrinkles being granular and falling into two broken series almost parallel with the curve of the antero-lateral borders. Every margin of the carapace is granular, as is also—besides the rugosities already mentioned—but more finely, a good deal of the surface near the margins.

The antero-lateral border is thin and rather sharp and is cut into four teeth, the first three of which are broad and anteriorly acuminate, the last narrow and carinated.

The front, which is nearly a fourth the greatest breadth of the carapace, is prominent, is separated from the orbit by a deep notch, and is bilobed, each lobe being cut into three teeth. The inner lower angle of the orbit is of the same size and form and as prominent as the innermost (largest) lobule of the frontal lobes.

Chelipeds massive, a little unequal; upper and outer surfaces of wrist and upper (and sometimes in the case of the smaller cheliped the greater part of the outer) surface of hand granular; fingers stout and rather short: inner angle of wrist sharply prominent, somewhat upcurved, a finely beaded line passing from its summit, backwards, along the whole length of the wrist.

Legs stout, with a rough and furred or scurfy surface, the upper border of the last four joints and the lower border of the last two rather abundantly fringed with fine stiff hairs.

Colours in spirit light brown, or greenish brownish yellow; fingers black.

In the Indian Museum are 6 specimens, from Mergui, Arakan, Diamond I., Singapore.

#### Alliance II. *Pseudozoida*.

##### PSEUDOZIUS, Dana.

*Pseudozius*, Dana, Silliman's Journal (2) XII. 1851, p. 127; Proc. Ac. Nat. Sci. Philad. 1852, p. 81; and U. S. Expl. Exp. Crust. pt. I. p. 232.

*Pseudozius*, Miers, Challenger Brachyura, p. 141.

Carapace broad, transversely oval, little convex or quite flat, the regions not demarcated.

Antero-lateral border arched, shorter than postero-lateral border, obscurely divided into four very shallow lobes.

Front rather broad, much more than a fourth the greatest breadth of the carapace, separated from the orbit by a notch, excised in the middle line and having the outer angles pronounced,—and so, obscurely four-partite.

Orbital margin entire, the upper and lower inner angles almost in contact. The antennules fold nearly transversely.

Basal antennal joint very short, the next joint reaches the front; the flagellum, which is hardly as long as the major diameter of the orbit, lodged in a notch between the front and the orbital wall, but quite outside the latter.

The crests of the endostome, defining the expiratory channels, are strong, and the anterior border of the merus of the external maxillipeds is notched to assist in forming a permanent expiratory orifice.

Chelipeds massive, unequal in both sexes, the fingers pointed, not hollowed.

Abdomen of the male with all 7 segments distinct.

103. *Pseudozius caystrus* (Ad. and White) Miers.

*Panopeus caystrus*, Adams and White, Samarang Crust. p. 42, pl. ix. fig. 2.

*Pseudozius planus*, Dana, Proc. Ac. Nat. Sci. Philad. 1852, p. 81; and U. S. Expl. Exp. Crust. pt. I. p. 233, p<sup>1</sup>, xiii, figs. 6a-h: Richters in Möbius, Meeresf. Maurit. p. 149.

*Pseudozius caystrus*, Miers, Challenger Brachyura, p. 142: Ortmann, Zool. Jahrb., Syst., VII, 1893-94, p. 434; and in Semon's Forschungen. (Jena. Denk. VIII), Crust. p. 49: de Man, Zool. Jahrb., Syst., VIII, 1895, p. 525: Whitelegge, Mem. Austral. Mus. III, 1897, p. 136.

Carapace transversely oval, depressed, smooth, almost flat behind the deflexed finely granular fronto-orbital region: no distinct regional boundaries.

The antero-lateral border is fairly sharp and is obscurely divided into four shallow lobes, the first two of which are rounded and almost confluent.

Front between a third and a fourth the greatest breadth of the carapace, bluntly four-partite.

Orbits with the margins entire, eyes small.

The buccal cavern is distinctly narrower anteriorly than posteriorly.

Chelipeds unequal, very massive, quite smooth to the naked eye; two strongish tubercles at the inner angle of the wrist; fingers arched, pointed, in the adult male they meet only at tip.

Legs smooth, dactyli furred, a few fine scattered silky bristles on the propodite.

Colours in spirit brownish yellow, fingers darker.

In the Indian Museum are 63 specimens, mostly from the Andamans, but also from the Mekrán (Baluchistán) coast, the Laccadives, and Bombay or Aden. (Also 2 from Samoa and 1 from Bantam).

Subfamily V. OZIINÆ.

Alliance I. *Ozioida*.

Ozius.

Epixanthus.

OZIUS, Edw.

Ozius, Milne Edwards, Hist. Nat. Crust. I. 404.

Ozius, Dana, Silliman's Journ. (2) XII. 1851, p. 127; and U. S. Expl. Exp. Crust. pt. I. p. 229.

Ozius, A. Milne Edwards, Ann. Sci. Nat. Zool. (4) XX. 1863, p. 289; and Nouv. Archiv. du Mus. IX. 1873, p. 237; and Miss. Sci. Mex., Crust. p. 276.



Carapace broad, transversely oblate-oval, moderately convex fore and aft, slightly convex or nearly flat from side to side; the regions, except the gastric, little defined; the surface smooth, or granular, often rugose anteriorly.

Antero-lateral borders of good length, strongly arched, usually broadly crenate or lobulate: postero-lateral borders convergent, usually about as long as the antero-lateral.

Front rather broad (considerably more than a fourth the greatest breadth of the carapace) obliquely deflexed, cut into four lobules or teeth of about equal size, separated from the orbit by a notch.

Orbits deep, rather small, the grooves near the outer angle inconspicuous: eyes on short thick stalks. The antennules fold nearly transversely.

Basal antennal joint prolonged between the side of the front and the orbital plate; the flagellum, which is very small (about half the major diameter of the orbit in length), stands in the orbital hiatus.

The ridges of the endostome, defining the expiratory channels, are very strong, and the opposed margin of the merus of the external maxillipeds is notched, usually very deeply, so that a permanent expiratory orifice results.

Chelipeds massive, unequal in both sexes; the fingers of good length, pointed not hollowed. In the Indian species there is a very large tooth at the base of the dactylus of the larger hand.

The abdomen of the male consists of 7 segments.

#### *Key to the Indian species of Osius.*

- I. Carapace more than  $\frac{3}{4}$  as long as broad, scabrous, more or less studded—like the wrists and hands—with salient pearly tubercles ..... *O. tuberculosus*.
- II. Carapace  $\frac{3}{4}$  as long as broad, smooth to feel, no tubercles; surface of wrists and hands—all or part—reticulate rugulose ... .. *O. rugulosus*.

#### 104. *Osius rugulosus*, Stimpson.

*Osius rugulosus*, Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 34: Heller, Novara Crust. p. 22, pl. iii. fig. 1: A. Milne Edwards, Nouv. Archiv. du Mus. IV. 1868, p. 71, and IX. 1873, p. 240, pl. xi. fig. 3: Miers, P. Z. S. 1877, p. 135: Haswell, Cat. Austral. Crust. p. 63: Cano, Boll. Soc. Nat. Napol. III. 1889, p. 204: Ortmann, Zool. Jahrb., Syst., VII. 1893-94, p. 477, and in Semon's Forschunger. (Jena. Denk. VIII.) Crust. p. 53.

Carapace two-thirds as long as broad, its surface everywhere finely pitted but not rough, a good deal rugulose and finely eroded just inside the antero-lateral borders: gastric region fairly well defined and in-

completely subdivided into three areolæ: branchial regions traversed by two ridges, which run respectively from the 3rd and 4th lobes of the antero-lateral borders, obliquely upwards and inwards to the gastric region.

Front cut into 4 equidistant teeth. Antero-lateral border rather faintly divided into 5 lobes, of which the first two are broad and rounded and the last three are bluntly acuminate. Orbital margin slightly tumid, well marked off from carapace; faint traces of two grooves near the outer angle; the inner angle of the lower margin a little prominent.

The upper and outer surfaces of both wrists and of the smaller hand, and the upper surface of the larger hand are reticulate-rugulose.

Legs stout, the last three joints and part of the under surface of the meropodites of all are tomentose.

Efferent branchial foramen large, sub-quadrangular.

Colours in spirit, dark violet brown or dark bluish brown, fingers black.

In the Indian Museum are 5 specimens, from the Andamans and Arakan.

#### 105. *Ozius tuberculosus*, Edw.

*Ozius tuberculosus*, Milne Edwards, Hist. Nat. Crust. I. 405: Heller, Novara Crust. p. 23: A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 238, pl. xi. fig. 2: Muller, Verh. Ges. Basel VIII. 1886, p. 474: de Man, Journ. Linn. Soc., Zool., XXII. 1887-88, p. 45: J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 364.

Carapace more than two-thirds as long as broad, studded (except sometimes in the central and posterior parts) with small sharp pearly tubercles; gastric region well defined and imperfectly divided into elongate areolæ; branchial regions crossed transversely by two crescentic furrows, which have a common starting-point at the fourth tooth of the antero-lateral margin; post-orbital furrow well defined.

Front sunk below the level of the orbits, cut into four equidistant scabrous teeth. Antero-lateral border granular, cut into five teeth (exclusive of the orbital angle), of which the last is tuberculiform and the first four are broad and anteriorly-acuminate.

The lower edge of the orbit is separated from the tumid arch of the upper edge by a small gap, and is deeply concave between the dentiform external and internal angles.

Basal antennal joint massive, sinuous, granular. Efferent branchial foramen large, subcircular.

Chelipeds and legs with rough harsh surfaces: the upper and outer surfaces of the wrists and hands are for the most part studded with

sharp pearly tubercles like those on the carapace: the inner angle of the wrist is somewhat produced and forms a double-crowned tubercle.

The whole animal has a harsh feel, due partly to the roughness of the surface and partly to the presence of very short, stubbly, scattered bristles.

Colours in spirit, light red or madder, fingers darker, dactyli of legs blackish.

In the Indian Museum are two specimens, from Mergui and the Nicobars.

#### EPIXANTHUS, Heller.

*Epixanthus*, Heller, SB. Ak. Wien, XLIII. 1861, i. p. 323.

*Epixanthus*, A. Milne Edwards, Ann. Sci. Nat., Zool., (4) XX. 1863, p. 290; and Nouv. Archiv. du Mus. IX. 1873, p. 240.

*Epixanthus*, de Man, Journ. Linn. Soc. Zool. XXII. 1887-88, p. 45.

Carapace very broad, transversely oval, either moderately convex or almost flat, the regions very obscurely marked.

Antero-lateral borders long, strongly arched, with a thin sharp edge, usually regularly fissured or dentate: postero-lateral borders strongly convergent.

Front broad (from one-fourth to nearly one-third the greatest breadth of the carapace), slightly deflexed, separated from the supra-orbital margin by a notch, cut into four teeth or lobes. Either a suture or a gap beneath outer angle of orbit.

Antennules folding transversely, inter-antennular septum broad. Basal antennal joint very broad and short, largely in contact with the front; flagellum very short (less than half the major diameter of the orbit), lodged in the orbital hiatus.

The ridges of the endostome, defining the expiratory canal, are very strong, but the anterior border of the merus of the external maxillipeds is either not at all or only very slightly notched.

Chelipeds massive, unequal in both sexes; fingers long, pointed, those of the smaller hand being remarkably long and slender.

Abdomen of the male with all 7 segments distinct.

#### Key to the Indian species of *Epixanthus*.

- I. Carapace nearly flat, nearly smooth; antero-lateral border divided by very short narrow fissures into four broad shallow lobes..... *E. frontalis*.
- II. Carapace convex, scabrous; antero-lateral border deeply cut into five sharp thin teeth..... *E. dentatus*.

106. *Epixanthus frontalis*, (Edw.) Heller.

*Ozius frontalis*, Milne Edwards, Hist. Nat. Crust. I, 406 : Krauss, Sudafr. Crust. p. 31 : Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 34 : Hilgendorf, in v. d. Decken's Reisen Ost-Afr. III, i. p. 75.

*Epixanthus frontalis*, Heller, Novara Crust. p. 20 : A. Milne Edwards, Nouv. Archiv. du Mus. IX, 1873, p. 241 : Kossmann, Reise roth. Meer., Crust. p. 36 : Richters, in Möbius, Meeresf. Maurit. p. 148, pl. xvi. fig. 16 : Lenz and Richters, Abh. senck. Ges. XII, 1881, p. 421 : Miers, Zool. H. M. S. Alert, pp. 517, 534 : F. Muller, Verh. Ges. Basel, VIII, 1886, p. 474 : de Man, Journ. Linn. Soc. Zool., XXII, 1887-88, p. 46 ; and Archiv. fur Naturges. LIII, 1887, i. p. 292 ; and Zool. Jahrb., Syst. 1894-95, p. 525 ; Cano, Boll. Soc. Nat. Napol. III, 1889, p. 205 : J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 364 : Ortman, Zool. Jahrb., Syst., VII, 1893-94, p. 477.

*Epixanthus kotschii*, Heller, SB. Ak. Berl. XLIII, 1861, i. p. 325, pl. i. fig. 14 (*vide* Heller).

Carapace transversely oval, depressed, almost flat, its length a little over  $\frac{5}{8}$  its breadth, granular and finely and faintly rugulose just inside the frontal and antero-lateral borders, smooth elsewhere. The gastric region and its three subregions are faintly indicated, and a low fine sinuous ridge completely traverses each branchial region from the last tooth of the antero-lateral border.

The front, which is a good deal less than a third the greatest breadth of the carapace, and has a double edge, is cut into four low teeth. Below the outer angle of the orbit there is a suture, not a gap.

Antero-lateral border thin and sharp, divided by short, narrow notches into four very broad shallow lobes, of which only the last two are at all acuminate.

Chelipeds massive, remarkably unequal—in the adult male especially. They are practically smooth. The fingers of the larger hand of the adult male are strongly arched and meet only at tip.

Legs almost smooth ; the borders of the dactylus and of the distal half of the propodite, in all, are covered with a short stubbly fur.

Colours in spirit, dirty yellowish or greenish brown, fingers blackish.

In the Indian Museum are 60 specimens, from the Andamans, Mergui, Akyab, Orissa coast, Ceylon, Makran coast (besides 22 specimens from localities outside India).

107. *Epixanthus dentatus*, (White).

*Panopeus dentatus*, White, P. Z. S. 1847, p. 226 ; Ann. Mag. Nat. Hist. (2) II. 1848, p. 286 ; Adams and White 'Samarang' Crust. p. 41, pl. xi. fig. 1.

*Heteropanope dentatus*, Stimpson, Proc. Ac. Nat. Sci. Phila. 1858, p. 35 : A. Milne Edwards, Nouv. Archiv. du Mus. IV. 1868, p. 71.

*Epixanthus dentatus*, Miers, Ann. Mag. Nat. Hist. (5) V. 1880, p. 233 : de Man, Journ. Linn. Soc., Zool., XXII. 1887-88, p. 46 : Henderson, Trans. Linn. Soc., Zool.,

(2) V. 1893, p. 364: Ortmann, Zool. Jahrb., Syst., VII. 1893-94, p. 478; and in Semon's Forschungsr. (Jena. Denk. VIII.) Crust. p. 53.

*Epizanthus dilatatus*, de Man, Notes Leyden Mus. I. 1879, p. 58 (*vide* de Man).

*Panopeus acutidens*, Haswell, P. L. S., N. S. W., VI. 1881-82, p. 542; and Cat. Austral. Crust. p. 51, pl. i. fig. 2.

Carapace transversely oval, convex fore and aft, slightly so from side to side; its length about  $\frac{9}{15}$  its breadth; its surface granular and somewhat tuberculous anteriorly, the tubercles being almost squami-form and fringed with short stubbly hair. The gastric region and its three subregions are very faintly indicated: the branchial regions are traversed by a low, sinuous, finely granular ridge.

The front, which is somewhat less than a third the greatest breadth of the carapace, has a rather indistinctly double edge and is cut into four lobes. There is a distinct gap in the orbital margin just below the outer orbital angle.

The antero-lateral border is deeply cut into five very thin sharp-edged teeth.

The exposed surfaces of the arms wrists and hands are finely reticulate-rugulose (most strongly marked on the hands) the reticulating wrinkles being covered with a very short stubbly or scurfy tomentum. Similar reticulating lines and patches of the same stubbly or scurfy growth also closely cover the surfaces of the leg joints.

Colours in spirit, dull earthy brown or yellowish, the carapace and chelipeds commonly mottled or marbled.

In the Indian Museum are 5 specimens, from Mergui and the Andamans (besides 2 from the South Sea Is.).

## Alliance II. *Ruppellioida*.

Euruppellia.

Baptozius.

### Subgenus EURUPPELLIA.

*Ruppellia*, Milne Edwards, Hist. Nat. Crust. I. 420 (part).

*Ruppellia*, Dana, Silliman's Journal (2) XII. 1851, p. 128, and U. S. Expl. Exp. Crust. pt. I. p. 245.

*Ruppellia*, A. Milne Edwards, Ann. Sci. Nat., Zool., (4) XX. 1863, p. 291.

*Euruppellia*, Miers, Zool., H. M. S. Alert, p. 534.

Differs from *Ozius* only in the form of the orbits. The upper and lower inner angles of the orbit are in contact, so as to close the orbit and to completely exclude the antennary flagellum.

I do not think this character is of generic importance, and I agree with Kossmann that the type of this genus should be included with *Ozius*.

There is however one species, *Ruppellia vinosa*, Edw., that is entirely different from any of the species (with, perhaps, the exception of *Ruppellia lata*, A. M. E.) with which it has hitherto been supposed to be congeneric.

This species I have separated as the type of a new genus *Baptozius*.

If, however, the other species of H. Milne Edwards' genus *Ruppellia* are referred to *Ozius*, then the name *Euruppellia* must be retained, in a different sense, for *Ruppellia vinosa* Edw., and the name *Baptozius* must lapse.

108. *Ozius* (*Euruppellia*) *tenax*, Ruppell.

*Cancer tenax*, Ruppell, 24 Krabben roth. Meer., p. 11, pl. iii. fig. 1, pl. vi. fig. 5.

*Endora tenax*, De Haan, Faun. Japon. Crust., p. 22.

*Ruppellia tenax*, Milne Edwards, Hist. Nat. Crust. I. 421: Kossmann, Reise roth. Meer., Crust., p. 40.

Carapace transversely oblate-oval, two-thirds as long as broad, rugulose and granular antero-laterally, smooth to the naked eye elsewhere. Gastric region well demarcated in its anterior two-thirds, and broken up into five incompletely separated but rather convex lobules: branchio-hepatic regions divided into two transverse somewhat convex areas, independent of the rugosities inside the antero-lateral margin.

Front sunk below the level of the orbits, cut into four equidistant rounded granular teeth. Supra-orbital margin tumid, well delimited from carapace, with two distinct grooves near the outer angle. Infra-orbital margin separated from the supra-orbital by a notch, deeply concave between the prominent dentiform internal and external angles.

Antero-lateral border granular, cut into five teeth, the first four of which are broad and anteriorly-acuminate, the fifth tuberculiform.

Chelipeds markedly unequal; upper and outer surfaces of wrist very finely granular, upper and more or less of outer surface of hand granular and studded with larger pustulous granules: inner angle of wrist bluntly bicuspid: fingers pointed, those of smaller hand long and rather slender, as in typical *Ozius*; those of larger hand stout, the movable finger with a huge tooth at base, as in Indian species of *Ozius*.

Legs stout, finely granular under a lens, but smooth to naked eye; the dactyli covered with velvet up to the claw.

Colours in spirit reddish yellow, the reddish tinge darkest on carapace.

In the Indian Museum is a fine specimen from the Mekrán (Baluchistán) coast.

109. *Ozius* (*Euruppellia*) *annulipes*, Edw.

*Ruppellia annulipes*, Milne Edwards, Hist. Nat. Crust. I. 422 : Dana, U. S. Expl. Exp. Crust. pt. I. p. 246, pl. xiv. figs. 4a-c : Stimpson, Proc. Acad. Nat. Sci. Phila. 1858, p. 37 : A. Milne Edwards, Nouv. Archiv. du Mus. IV. 1868, p. 71 : Haswell, Cat. Austral. Crust. p. 73 : Ortmann, Zool. Jahrb., Syst., VII. 1893-94, p. 479 : Whitelegge, Mem. Austral. Mus. III. 1897, p. 137.

*Euruppellia annulipes*, Miers, Zool. H. M. S. Alert, pp. 517, 523 : de Man, Archiv. fur Naturges. LIII. 1887, i. p. 293, pl. xi. fig. 4 (hand only).

Closely resembles *Ozius* (*Euruppellia*) *tenax*, but differs as follows:—(1) the front is cut into four broader, shallower and much less prominent teeth : (2) the five teeth of the antero-lateral border are much sharper, and the margin of the first three is sharp and crest-like : (3) the supra-orbital margin is, practically, entire, the grooves near the outer angle being hardly visible even with a lens : (4) the infra-orbital margin is separated from the supra-orbital only by a shallow groove, is not concave, and has its outer angle hardly prominent.

In the Indian Museum is a specimen from Muscat (besides one from Samoa).

## BAPTOZIUS, n. gen.

*Ruppellia* (part) Milne Edwards, Hist. Nat. Crust. I. 420.

Type RUPPELLIA VINOSA, Edw. (*Op. cit.* I. 422).

Carapace broad, transversely oval, moderately convex fore and aft, slightly so from side to side, with no indication of regions.

Front very broad, about two-fifths the greatest breadth of the carapace, obliquely deflexed, with a thin almost straight edge.

Antero-lateral border short, not two-thirds the length of the postero-lateral, thin, cut into four sharp-edged teeth.

Orbits large, with a sharp, prominent, entire edge : the upper and lower inner angles are in contact, so as to completely exclude the antennary flagellum.

Antennules folding nearly transversely, the inter-antennular septum very broad.

Basal antennal joint massive ; the flagellum of good length (about three-quarters the major diameter of the large orbit), lodged beneath the front and quite outside the orbital wall.

The crests of the endostome that define the expiratory canals are very strong, and a permanent orifice is formed not, as in *Ozius*, by a notch in the anterior border of the merus of the external maxillipeds—for the anterior border of the merus of the external maxillipeds is

entire—but by a deep emargination of the prolonged foliaceous opercular process of the first maxillipeds.

Chelipeds fairly massive, unequal in both sexes; fingers of good length, pointed.

Abdomen of male with all seven segments distinct.

#### 110. *Baptozius vinosus*, (Edw.)

*Ruppellia vinosa*, Milne Edwards, Hist. Nat. Crust. I. 422.

*Euruppellia vinosa*, de Man, in Weber's Zool. Ergebn. Niederl. Ost-Ind. II. 1892, p. 278, pl. i. fig. 1.

Carapace broad, transversely oval, with a shiny frosted surface due to extremely close fine granulation, the granules becoming vesiculous and plainly visible to the naked eye near the frontal, orbital, and lateral borders.

The orbits are marked off by a fine groove, a short shallow A-shaped groove bisects the front and ends on the anterior part of the gastric region, and a fine sinuous crease passes from the interval between the third and fourth tooth of the antero-lateral margin inwards towards the gastric region; otherwise the surface of the carapace is unbroken.

Front nearly two-fifths the greatest breadth of the carapace, almost straight, with a fine double edge, the upper rim of which runs on to the orbit while the lower turns obliquely downwards to rest on the basal antennal joint,—both rims finely beaded.

The antero-lateral borders are cut into four thin sharp-edged teeth, the first three of which are somewhat angular, while the last is elegantly procurved: the edges of all are finely beaded.

The orbits are large and almost subtubular: the finely-beaded edge is entire, and the inner angle of the lower border is bluntly prominent: quite inside the orbit, where the cornea comes into contact, is an elegant fringe of eye-lashes.

The upper and outer surfaces of the wrists and hands are finely frosted: the inner angle of the wrist has the form of a sharp spine.

The last three joints of the legs are more or less covered with a harsh tomentum, thickest along the upper surface.

Colours in spirit: carapace dark purple above, dark greenish below, legs greenish, chelipeds greenish daubed with red and purple, fingers red. In very old spirit specimens the carapace and chelipeds are of a rosy madder.

In the Indian Museum are 4 specimens from the Andamans and one from an unrecorded (Indian) locality.



## Sub-family VI. PILUMNINÆ.

Alliance I. *Pilumnoida*.*Pilumnus*.*Actumnus*.*PILUMNUS*, Leach.

*Pilumnus*, Leach, Trans. Linn. Soc. XI. 1815, p. 321; and Malac. Podophth. Brit.: Latreille, Encycl. Meth. X. p. 124: Desmarest, Consid. Gen. Crust. p. 111: De Haan, Faun. Japon. Crust. p. 19: Milne Edwards, Hist. Nat. Crust. I. 415: Dana, Silliman's Amer. Journ. Sci. and Arts, (2) XII. 1851, p. 127, and U. S. Expl. Exp. Crust. p. 229: Milne Edwards, Ann. Sci. Nat. Zool. (4) XX. 1863, p. 285: Kossmann, Reise roth. Meer. p. 37: Milne Edwards, Miss. Sci. Mex. Crust. p. 280: Miers, Challenger Brachyura, p. 145.

In the numerous species of this genus the carapace and legs are generally thickly covered with hair.

Carapace transversely oval or subquadrilateral, declivous anteriorly, flat posteriorly, not greatly broader than long; the regions, as a rule, but moderately plainly demarcated and areolated.

Antero-lateral borders not longer, but commonly shorter, than the postero-lateral, and cut into teeth which, very commonly, are spiniform.

The front is usually about a third the greatest breadth of the carapace, but is sometimes broader: it is cut into two lobes, the outer angle of each of which commonly forms an independent dentiform or spiniform lobule separated from the supra-orbital angle by a groove or notch.

The orbits generally have a gap or fissure just below the outer angle, and one or two gaps or notches in the upper border: the inner lower orbital angle is commonly sharp and prominent. The eyestalks are moderately long and slender.

The antennules fold transversely. The basal antennal joint is short, either not quite touching the front, or just touching it by its inner angle; the flagellum, which is planted in the orbital hiatus, is long, usually very much more than the major diameter of the orbit.

The ridges of the endostome, defining the expiratory channels, are usually plain but not very high: the anterior border of the merus of the external maxillipeds is almost transverse and is not notched.

The chelipeds are stout, the fingers coarse, short and pointed. Legs usually stout and of moderate length.

The abdomen of the male consists of seven separate segments.

*Key to the Indian species of Pilumnus.*

## 1. Abnormal species:—

Carapace and chelipeds quite smooth and devoid of hair *P. lævis*.

Carapace covered with symmetrically disposed, raised, curved or sinuated ridges ..... *P. labyrinthicus*.

2. Normal species in which the carapace (like the legs and the greater part of the chelipeds) is covered with a more or less thick coat of hair, and is without raised ridges:—

1. Front about a third the greatest breadth of the carapace:—

- i. Carapace declivous anteriorly, flat posteriorly; the outer orbital angle is not a spine, though it may be sharp:—

1. Upper margin of orbit with two, very distinct, triangular gaps or notches:—

- a. A subhepatic spine just below outer orbital angle ..... *P. vespertilio*.

- b. No subhepatic spine:—

- α. Free edge of front, and upper margin of orbit, finely denticulate: front very prominent ..... *P. longicornis*.

- γ. Free edge of front, and upper orbital margin, smooth or nearly so: front not prominent ..... *P. andersoni*.

2. Upper margin of orbit with one or both of the two notches indistinct or absent:—

- a. Regions and areolæ of carapace convex, uniformly granular, and separated by smooth, deepish, clean-cut grooves ..... *P. carulescens*.

- b. Regions etc. of carapace faintly demarcated and not uniformly granular:—

- z. Notches in the denticulated upper orbital margin faint but distinguishable ..... *P. sluteri*.

- γ. Only one notch in the smooth upper orbital margin, and that faint: legs long and slender ..... *P. cursor*.

- ii. Carapace uniformly convex, or globose; the outer orbital angle is a spine like those of the antero-lateral border:—

1. Regions of carapace fairly distinct: whole outer surface of larger hand covered with sharp prominent spine-like tubercles ..... *P. dorsipes*.

2. Regions of carapace faint; lower part of outer surface of hand smooth ..... *P. hirsutus*.

- II. Front nearer half than a third the greatest breadth of the carapace, nearly straight, finely denticulated, emarginate in the middle line ..... *P. dehaanii*.

111. *Pilumnus vespertilio*, Fabr.

*Cancer vespertilio*, Fabricius, Ent. Syst. II. 463, and Suppl. p. 338.

*Pilumnus vespertilio*, Deamarest, Consid. Gen. Crust. p. 112 : Latreille, Encyc. Meth. X. p. 125 : Milne Edwards, Hist. Nat. Crust. I. 418, and in Cuvier's Règne An., Crust. pl. xiv. fig. 3 : Dana, U. S. Expl. Exp. Crust. pt. I. p. 236 : Heller, SB. Ak. Wien, XLIII. 1861, p. 343 : A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 242 : Miers, Crust. New Zealand, p. 19 ; and Ann. Mag. Nat. Hist. (5) V. 1880, p. 234 ; and Zool. H. M. S. Alert, pp. 183, 219 : Tozzetti, Magenta Crust. p. 55, pl. iv. figs. 25, 27, 32 : Hilgendorf, MB. Ak. Berl. 1878, p. 793 : E. Nauck, Zeits. Wiss. Zool. XXXIV. 1880, p. 53 (*gastric teeth*) : Richters in Möbius Meeresf. Maurit. p. 148 : Haswell, Cat. Austral. Crust. p. 65 : Filhol, Crust. New Zealand, p. 374, pl. xlv. fig. 5 : de Man, Journ. Linn. Soc., Zool., XXII. 1887-88, p. 58 ; and Archiv. für Nat. LIII. 1887, i. p. 295 ; and in Weber's Zool. Ergebn. Niederl. Ost-Ind. II. 1892, p. 283 ; and Zool. Jahrb., Syst., VIII. 1894-95, p. 537 : Cano, Boll. Soc. Nat. Napol. II. 1889, p. 206 : A. O. Walker, Journ. Linn. Soc., Zool., XX. 1886-90, p. 110 : J. R. Henderson, Trans. Linn. Soc., (2) V. 1893, p. 365 : Ortmann, Zool. Jahrb., Syst., VII. 1893-94, pp. 436, 438, and in Semon's Forschungs. (Jena. Denk. VIII) Crust. p. 49 : Zehntner, Rev. Suisse Zool. II. 1894, p. 154.

*Pilumnus ursulus*, Adams and White, Samarang Crust. p. 45, pl. ix. fig. 6 : Hess, Archiv. für Nat. XXXI. 1865, i. pp. 137, 171, pl. vi. fig. 2 : Kossmann, Reise roth. Meer., Crust. p. 39 : F. Muller, Verh. Ges. Basel, VIII. 1886, p. 475.

Carapace, legs and chelipeds (with the exception of the fingers and the lower corner and lower border of the hand, which are bare) entirely concealed by a thick, dark, shaggy coat of coarse, tufted and somewhat matted hair. The hairs are of two kinds, longer and shorter, the longer being most numerous on the legs and on the borders of the carapace. The following description (and the descriptions of all the species mentioned in this paper) applies to the denuded animal.

Carapace transversely oval, nearly  $\frac{3}{2}$  as long as broad, flat posteriorly, a good deal deflexed anteriorly, the regions fairly distinctly delimited and areolated, the surface studded with small well-separated clusters of granules, from which the hairs spring.

Front obliquely deflexed, about a third the greatest breadth of the carapace, cut into two lobes, each of which consists of a large prominent convex inner division and a small receding semi-independent, but not dentiform, outer angle, lying nearly in front of the inner upper angle of the orbit.

The orbital margins, like the edge of the front, are smooth or obscurely crenulate ; in the upper margin are two broad triangular gaps : the outer angle of the orbit is sharp but not spiniform, and immediately below it is a fissure or gap in the infra-orbital margin.

The antero-lateral border is a little shorter than the postero-lateral, and is cut into three spiniform teeth, besides which there is a sub-hepatic denticle behind and below the outer orbital angle.

The chelipeds are unequal: the inner angle of the wrist may be sharp, but is never spiniform: the upper and outer surfaces of the wrists, of the smaller hand, and of all but the lower border and lower outer corner of the larger hand (which is quite bare and usually quite smooth) are covered with clusters of granules, some of which, on the smaller hand—and sometimes also on the larger hand—are arranged in longitudinal series.

The carpopodites and propodites of all the legs, and the meropodites also of the last pair, have the anterior and dorsal aspects granular. The longest legs are not much more than half again as long as the carapace.

In the Indian Museum are 64 specimens, chiefly from the Andamans, but also from Mergui and Palk Straits; (besides 10 specimens from other parts of the Indo-Pacific).

*Pilumnus vespertilio*, var.

Differs from the above only in having (1) the fur stiff, fine, bristly, and golden-yellow in colour, and (2) the whole of the outer surface—but not the lower border—of the larger hand granular.

In the Indian Museum are 9 specimens from Karáchi and 1 from Tavoy.

112. *Pilumnus longicornis*, Hilgendorf.

*Pilumnus longicornis*, Hilgendorf, MB. Ak. Berl., 1878, p. 794, pl. i. figs. 8, 9.

Carapace covered with a fine and very short fur, amid which—especially anteriorly—are numerous long silky bristles. Legs and chelipeds—except the larger hand, the greater part of which is quite bare—covered with similar fur and fringed with similar bristles.

Carapace somewhat quadrilateral or hexagonal, about  $\frac{7}{8}$  as long as broad, anteriorly deflexed, posteriorly flat; the regions fairly distinctly defined and areolated, the surface granular near the frontal and antero-lateral margins, elsewhere smooth to the naked eye.

Front obliquely deflexed, about a third the greatest breadth of the carapace, deeply cut into two lobes, each of which consists of a prominent angularly-convex inner portion and an independent spiniform outer angle; the free edge finely and evenly denticulate.

Two triangular gaps in the finely denticulated upper orbital margin and a fissure in the denticulated lower margin, just below the outer angle, which is not dentiform or very conspicuous.

Antero-lateral margin a good deal shorter than the postero-lateral, cut into three longish procurved spiniform teeth the bases of which are granular. No denticle—at most only a slightly-enlarged granule—below the outer angle of the orbit.

Antennary flagellum considerably more than half the greatest length of the carapace, fringed with some long silky hairs.

Chelipeds very unequal; anterior border of ischium and arm spinulate or spinate, both the other borders of the arm spinulate or granular; upper and outer surfaces of wrist sharply granular, the inner angle of the wrist prolonged into a stout spine; the whole upper outer and lower surfaces of the smaller hand sharply granular, with several rows of enlarged spiniform granules, fingers of smaller hand fluted; the larger hand and fingers are smooth, except for a granular patch quite at the near end of the outer surface and extending a variable distance along the upper border of the hand, and for a small patch of granules at the base of the dactylus.

The upper border of the meropodites of the legs is usually sharply spinate.

Colours in spirit yellow, fingers dark brown.

In the Indian Museum are 21 specimens, from Mekrán, Karáchi, Bombay, Nicobars, and Malacca Strait.

### 113. *Pilumnus andersoni*, de Man.

*Pilumnus andersoni*, de Man, Journ. Linn. Soc., Zool., XXII. 1887-88, p. 59, pl. iii. figs. 5, 6, and Zool. Jahrb. Syst., VIII. 1895, p. 552.

Closely resembles *P. longicornis* from which it differs in the following particulars:—

(1) the carapace appears broader owing to the front being less prominent:

(2) the free edge of the front and the upper margin of the orbit are nearly or quite smooth; the lobes of the front are much less prominent, the notch between them is not so wide and deep, and the outer angles are dentiform, not spiniform:

(3) the outer angle of the orbit is sharper:

(4) the granular patch at the base and along the upper border of larger hand is larger.

In the Indian Museum are 5 specimens, from Mergui, Ceylon, Karáchi (and 5 from Gaspar Strait).

### 114. *Pilumnus sluiteri*, de Man.

*Pilumnus sluiteri*, de Man, in Weber's Zool. Ergebn. Niederl. Ost-Ind. II. 1892, p. 283, pl. i. fig. 2: Ortmann, Zool. Jahrb., Syst., VII. 1893-94; pp. 436, 438.

*Pilumnus forskalii*, de Man (nec Edw.), Archiv. für Naturges. LIII. 1887. i. p. 205, pl. xii. fig. 1.

Carapace, legs and chelipeds (except the fingers) covered with a

harsh coat of short bristles with longer bristles interspersed, the latter being most numerous on the legs.

Carapace about  $\frac{5}{6}$  as long as broad, deflexed anteriorly, nearly flat in the posterior two-thirds, the regions fairly distinctly delimited, the surface rather profusely studded with little pits, from which the tufts of bristles arise; some granules near the antero-lateral borders and on the front part of the gastric region.

Front cut into two lobes, each of which is again subdivided by a deep triangular gap into a large square-cut internal lobe and an acute triangular external lobule.

Orbital margin granular: there are two gaps in the upper margin, but the inner one is narrow and indistinct; there is also a small gap just below the outer angle of the orbit, which is not very prominent.

Antero-lateral margin not much shorter than the postero-lateral, cut into three somewhat granular spiniform teeth. No tooth below the outer angle of the orbit.

Antennary flagellum not quite a third the length of the carapace, not fringed with hairs, though there may be one or two at its base.

Chelipeds very unequal: upper and outer surfaces of both wrists and hands and bases of dactyli covered with granules or small pearly tubercles, which are larger and more numerous and more prominent on the hands than on the wrists; sometimes a small patch of granules on inner surface of hands: inner angle of wrists strongly pronounced and dentiform.

Legs stout, the longest pair are about two-thirds again as long as the carapace.

Colours in spirit: carapace yellow copiously overspread with brick-red, chelipeds and legs yellow blotched and sometimes banded with terra-cotta-red.

In the Indian Museum are 7 fine specimens from the Andamans (besides one from Samoa).

#### 115. ? *Pilumnus cursor*, A. Milne Edwards.

? *Pilumnus cursor*, A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 244, pl. ix. fig. 4: Haswell, Cat. Austral. Crust. p. 67: Miers, Zool. H. M. S. Alert, pp. 183, 223: de Man, Archiv. für Naturges. LIII. 1887, i. p. 299.

Carapace etc. covered with a short fur with long hairs interspersed, the latter most numerous on the legs.

Carapace subquadrilateral, flat in the posterior half or more, declivous anteriorly, the regions faintly marked, finely and sparsely granular.

Front nearly two-fifths the greatest breadth of the carapace, not

very prominent, divided into two lobes, each of which consists of a convex inner part and an independent though not very prominent external angle.

The upper orbital margin is little prominent and has only one notch and that indistinct: outer orbital angle not prominent.

Antero-lateral border very much shorter than the postero-lateral, cut into three sharp teeth: no subhepatic tooth.

Chelipeds unequal: inner angle of wrists sharply pronounced, upper and outer surfaces of hands granular.

Legs slender, the longest pair are more than twice the length of the carapace.

Colours in spirit, carapace reddish-yellow, legs yellow.

In the Indian Museum is a single specimen, from the Andamans.

I identify this species with *P. cursor* on account of the long slender legs, the subquadrilateral carapace, the very short antero-lateral borders, and the broad front.

#### 116. ? *Pilumnus caeruleus*, A. M. Edw.

? *Pilumnus caeruleus*, A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 242, pl. ix. fig. 3: L. Zehntner, Rev. Suisse Zool. II. 1894, p. 163.

Carapace etc. covered with short fur, with long hairs interspersed, about  $\frac{2}{3}$  as long as broad, subquadrilateral, convex in anterior half, flat posteriorly: the regions very distinctly defined by well cut grooves, the areolæ convex and studded with granules of good size.

Front a third the greatest breadth of the carapace, deflexed, cut into two lobes the outer angles of each of which form independent dentiform lobes.

The upper orbital margin shows very faint traces of two shallow notches: a small triangular gap below the sharp, but non-spiniform, outer orbital angle.

Antero-lateral borders a good deal shorter than the postero-lateral, cut into three sharp teeth, in addition to which there is a small denticle behind and below the outer orbital angle.

Chelipeds unequal; upper and outer surfaces of wrists and of both hands closely and sharply granular, fingers very short, inner angle of wrists dentiform.

Legs stout, the longest pair not much more than two-thirds again the length of the carapace.

Colours in spirit, dull blue with a brownish tinge in places, fingers blackish brown.

In the Indian Museum is a single specimen from the Andamans.

I judge this species to be *P. caeruleus* by the Xanthodes-like form and sculpture of the carapace mentioned by Milne Edwards.

117. ? *Pilumnus hirsutus*, Stimpson.

? *Pilumnus hirsutus*, Stimpson, Proc. Ac. Nat. Sci. Philad., 1858, p. 37 : Miers, P. Z. S. 1879, pp. 20, 31 : Haswell, Cat. Austral. Crust. p. 69 : Ortmann, Zool. Jahrb., Syst., VII. 1893-94, pp. 435, 437.

Carapace etc. covered with stiff hairs of two kinds—long and short, the former most numerous on the legs.

Carapace nearly  $\frac{3}{4}$  as long as broad, convex in both directions, smooth when denuded, the regions hardly marked.

Front about a third the greatest breadth of the carapace, deflexed, cut into two lobes much like those of *P. vespertilio* in shape.

Upper orbital margin smooth, with two very faint and shallow notches; lower margin denticulate, with a gap just below the outer angle. No subhepatic tooth.

Antero-lateral border much shorter than the postero-lateral, with 4 spiniform teeth, one of which is the orbital angle.

Antennary flagellum of moderate length, without hairs, except at base.

Chelipeds unequal; borders of arm finely granular or denticulate, wrists with the upper and outer surfaces rough and the inner angle sharply pronounced; lower part of outer surface of larger hand smooth, the rest of this surface—like that of the smaller hand—sharply granular, the granules becoming spiniform towards the upper border.

Legs rather slender, the longest pair about two-thirds again as long as the carapace.

Colours in spirit, yellow, fingers light brown.

In the Indian Museum are 11 specimens, from the Andamans, Mergui, and the Malacca Str.

118. ? *Pilumnus dorsipes*, Stimpson.

? *Pilumnus dorsipes*, Stimpson, Proc. Ac. Nat. Sci. Philad., 1858, p. 37.

Carapace *globose, extremely deep*, not very much broader than long, covered—like the chelipeds and legs—with soft, though stiff, hair, fairly well areolated, finely granular under a lens.

Front about a third the greatest breadth of the carapace, cut into two convex, rounded, finely denticulate lobes, of which the outer angles form dentiform lobules.

Upper orbital margin not prominent, the two notches are very faint and shallow (especially the inner one), but are recognizable: lower orbital margin with a deep narrow cleft just below the outer angle.

Antero-lateral margin cut into four denticulate spiniform teeth, one of which is the outer orbital angle. No subhepatic tooth.



Antennulary flagellum about a third the length of the carapace, not hairy, except at base.

Chelipeds unequal, both hands covered, on the outer surface and upper and lower borders, with prominent spiniform granules, which also extend some way along both fingers.

Legs rather short, the longest pair being about half again as long as the carapace.

Colours in spirit yellow.

The body is of such depth that the last pair of legs, even in the male, lie, in the normal inclination of the body vertically over the first pair.

In the Indian Museum is a single male from the Andamans.

#### 119. *Pilumnus de Haanii*, Miers.

*Pilumnus de Haanii*, Miers, P. Z. S. 1879, pp. 20, 32; and Challenger *Brachyura* p. 155, pl. xiv. fig. 1: A. O. Walker, Journ. Linn. Soc., Zool., XX. 1886-1890, p. 110.

Carapace covered with a very fine and short, but dense, fur: legs and chelipeds with a similar fur mixed with long fine hairs on outer surface of hands and on borders of legs.

Carapace transversely oval, not three-quarters as long as broad, the regions (when carapace is denuded) fairly well marked and areolated, granular towards the antero-lateral margins and near the front.

The front is nearer half than two-fifths the greatest breadth of the carapace, is nearly straight, not at all prominent, is finely denticulate, and emarginate in the middle line.

Orbital margin very finely denticulate, the upper border with two very inconspicuous notches, a fissure below the acute outer orbital angle.

Antero-lateral border a good deal shorter than the postero-lateral, cut into three shallow anteriorly-acuminate teeth.

Chelipeds unequal: the outer surface of the wrists with a few granules anteriorly and along the inner border: upper and outer surfaces of hands closely covered with acute spiniform tubercles which also extend far along the fingers.

Legs stout, unarmed.

Colours in spirit, golden yellow.

In the Indian Museum are 7 specimens from Palk Str. 28 specimens from off Ceylon, 26½ to 34 fms., only differ from the typical form in having the front more deeply emarginate in the middle line.

This species, but for the broader straighter front, and for the broader carapace, more nearly resembles an *Actumnus* than a *Pilumnus*.

120. *Pilumnus labyrinthicus*, Miers.

*Pilumnus labyrinthicus*, Miers, Zool. H. M. S. "Alert," pp. 183 and 224, pl. xxii., fig. C: and "Challenger" Brachynura, p. 161: A. O. Walker, Journ. Linn. Soc. Zool. XX, 1896-1890, p. 110; Henderson, Trans. Linn. Soc. Zool. (2), V, 1893, p. 365.

"In this curious form the surface of the carapace is everywhere covered with raised curved or sinuated ridges, which are separated by wide depressions; the body and legs are covered with a dense close brown pubescence; from most of the ridges and from the teeth of the antero-lateral margins of the carapace spring longer setæ, and the margins of the ambulatory legs are also fringed with longer hairs. The frontal lobes, which are scarcely separated as usual by a median notch, are rather broad, straight, and but little prominent; the antero-lateral margins are somewhat shorter than the postero-lateral, and are armed with three distinct teeth, that of the exterior orbital angle being obsolete. The orbital margin is somewhat thickened; the epistoma rather longer in proportion to its breadth than is usual. The basal antennal joint is short, scarcely attaining to the sub-frontal process, and not nearly reaching to the apex of the very prominent lobe at the inner suborbital angle. The chelipeds are rather small and (like the carapace) are densely pubescent, besides being clothed with longer hairs; the outer surface of the wrist or carpus is tuberculated beneath the hairy coat; the palm is clothed externally with long dense hairs; the upper margin of the palm bears three distinct tubercles; the fingers are slaty coloured, dentated on their inner margins and acute at their apices. The ambulatory legs are densely hairy and of moderate length."

Not in the Indian Museum collection.

121. *Pilumnus* (?) *lævis*, Dana.

*Pilumnus lævis*, Dana, Proc. Ac. Nat. Sci. Philad. 1852, p. 82, and U. S. Expl. Expd. Crust. pt. i, p. 238; de Man, Journ. Linn. Soc. Zool. XXII, 1887-1888, p. 66, pl. iv. figs. 1 and 2: and Zool. Jahrb. Syst. VIII. 1895, p. 553.

"Near *P. levimanus*, but broader. Carapace smooth and shining, not areolate, rather convex: front emarginate, antero-lateral margin three-toothed, the teeth minute and like spines, the posterior much the smallest, outer angle of orbit not raised into a tooth. Anterior feet very unequal, carpus smooth, not even faint tuberculate; larger hand wholly smooth, smaller sparsely hirsute, not at all tuberculate. Posterior eight feet slender, somewhat hirsute."

A single specimen from Mergui. It appears to me doubtful that this species belongs to the genus *Pilumnus*.

122. *Pilumnus seminudus*, Miers.

*Pilumnus seminudus*, Miers, Zool. H. M. S. "Alert" pp. 183 and 222, pl. xxi. fig. C: "Challenger" Brachyura, p. 161: de Man, Journ. Linn. Soc. Zool. XXII, 1887-1888, p. 65.

"This species resembles *P. semilanatus* in having the gastric, cardiac, and branchial regions of the carapace smooth and naked; but it may be at once distinguished by the following characters:—The carapace is broader in proportion to its length, and its anterior parts clothed with a close velvety pubescence, which also extends over the upper and outer surface of the wrist and palm of the chelipeds; the two posterior teeth of the antero-lateral margins are more distinctly spiniform, the basal antennal joint does not nearly reach to the sub-frontal process; the granulations of the wrist and palm are much more inconspicuous, those of the outer surface of the palm appear, through the pubescence, to be arranged in four distinct longitudinal series; the ambulatory legs are slenderer."

A single small specimen in the Indian Museum, from Mergui, has been referred by Dr. de Man to this species.

## ACTUMNUS, Dana.

*Actumnus*: Dana, Silliman's Amer. Journ. Sci. and Arts, (2) XII. 1851, p. 128; and Proc. Acad. Nat. Sci. Philad. VI. 1852, p. 82; and U. S. Expl. Exp. Crust. pt. i. p. 243: A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 284.

Carapace very little broader than long, convex, fairly well or very well areolated: the antero-lateral borders short, cut into teeth; the postero-lateral longer than the antero-lateral, concave.

Front from about a third to about two-fifths the greatest breadth of the carapace; cleft or notched in the middle line, or bilobed with the outer angles independent, usually separated from the supra-orbital angle by a notch or groove.

Orbits rather large, with one or two notches or fissures or suture-lines (which often, however, are indistinct) in the upper margin, and one (often, also, very indistinct) in the lower margin near the outer angle. The inner lower angle of the orbit is prominent, and often comes so near to the supra-orbital angle as to almost exclude the antennary flagellum from the actual orbital hiatus.

The basal antennal joint touches or nearly touches the front; the flagellum which is of moderate length (longer than the major diameter of the orbit) sometimes springs from the orbital hiatus, but is sometimes almost excluded from the hiatus.

The crests of the endostome, defining the expiratory channels, are

not very strong, and the anterior border of the merus of the external maxillipeds is not notched.


The chelipeds are stout, and are unequal in both sexes: the fingers, which are short and stout, are commonly defined as spoon-shaped at tip: they are not really so, but have the tips curved and blunt pointed.

The legs are stout and not very long.

The abdomen of the male consists of seven separate segments, and the first tergum is unusually long and narrow in all the typical species.

Most of the species of this genus, but not all, are densely tomentose: all, however, have hairy or tomentose legs.

### Key to the Indian species of *Actumnus*.

- I. Carapace tomentose:—
  - i. Carapace areolated: front separated from the supra-orbital angle by a notch; antero-lateral border cut into 3 teeth (exclusive of outer angle of orbit):—
    1. Front normally bilobed: supra-orbital margin granular, with two distinct notches:—
      - a. Carapace moderately convex, rather faintly areolate; outer angles of front hardly independent ..... *A. tomentosus*.
      - b. Carapace strongly convex, strongly areolate; the outer angles of the front are small distinct little lobules:—
        - x. Lateral gastric areolæ semi-circular ..... *A. scitifer*.
        - y. Lateral gastric areolæ  shaped ..... *A. verrucosus*.
    2. Front broadly triangular, with a deep button-hole cleft (the hole at posterior end) in the middle line: supra-orbital margin thin sharp, with a single deep very narrow fissure..... *A. fissifrons*.
  - ii. Carapace not areolated; front not separated from the supra-orbital angle; antero-lateral border with 7 spinuliform granules (3 pairs) and an odd one anteriorly ..... *A. elegans*.
- II. Carapace perfectly bare:—
  - i. Carapace not areolate, front broadly bilobed; legs almost bare ..... *A. nudus*.
  - ii. Carapace very distinctly areolate, front with two median lobes and two (external) lobules: legs tomentose:—
    1. Surface of carapace (and of parts of chelipeds) formed of a mosaic of smooth flat polygonal granules in the closest contact ..... *A. tessellatus*.
    2. Surface of carapace, etc. covered with sharp crystalline granules in the closest contact ... *A. arbutum*.

123. *Actumnus tomentosus*, Dana.

*Actumnus tomentosus*, Dana, Proc. Ac. Nat. Sci. Philad. 1852, p. 82; and U. S. Expl. Exp. Crust. pt. i. p. 243, pl. xiv. figs. 2a-c: A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 285, and IX. 1873, p. 194: ? Tozzetti, Magenta Crust. p. 56, pl. iv. figs. 22, 24, 26, 29: Haswell, Cat. Austral. Crust. p. 73: Etheridge, Mem. Austral. Mus. 1889, pp. 34, 36.

Carapace subcircular, rather more than  $\frac{3}{4}$  as long as broad, moderately convex, covered with a very dense short smooth tomentum. Much the same tomentum covers the exposed surfaces of the legs and chelipeds (except the lower and distal part of the outer surfaces of the hands), and the legs are also fringed with long fine hairs.

The regions are fairly well delimited and areolated, the areolæ being moderately convex: on the undenuded carapace the areolæ are faint.

Front about two-fifths the greatest breadth of the carapace, cut into two finely denticulated lobes, the outer angles of each of which, though sharply separated from the supra-orbital margin, do not form distinct lobules.

Orbital margin finely denticulate, the lower more markedly so than the upper; in the upper margin are two broad notches, the outer the more distinct; in the lower margin, just below the outer angle, is a narrow fissure; outer orbital angle dentiform.

Antero-lateral borders about two-thirds the length of the concave postero-lateral, very regularly cut into 3 uniform teeth similar to the outer orbital angle.

Chelipeds unequal: arm smooth; inner angle of wrists sharp, their inner border finely beaded, a few scattered granules on their upper and outer surfaces; upper and outer surfaces of hands covered with pearly granules which become obsolescent or obsolete near the lower border of the larger hand; dactyli longitudinally grooved, beaded at base.

Denuded legs nearly smooth.

In the Indian Museum are 53 specimens, from the Andamans, the Orissa Coast up to 30 fms., Palk str. and Cheduba.

Our specimens completely agree with Dana's figure, and are easily distinguished from *A. setifer* by the less convex and less distinctly areolated carapace.

124. *Actumnus setifer*, (De Haan), A. M. Edw.

*Pilumnus setifer*, De Haan, Faun. Japon. Crust. p. 50, pl. iii. fig. 3 (*Xantho*).

*Actumnus setifer*, A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 287, pl. xv. figs. 5-5b: Richters in Möbius' Meeresf. Maurit. p. 118: Miers, Zool.

H. M. S. Alert, pp. 183, 225, 517, 533 : de Man, Journ. Linn. Soc., Zool., XXII. 1887-88, p. 47, and Archiv. für Naturges. LIII. 1887, i. p. 262 : Walker, Journ. Linn. Soc., Zool. XX. 1886-90, p. 110 : Pocock, Ann. Mag. Nat. Hist. (6) V. 1890, p. 74 : Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 364 : Ortmann, Zool., Jahrb. Syst. VII. 1893-94. p. 474.

Closely resembles *A. tomentosus*, from which it is distinguished by the following characters :—

The carapace is subglobular : the regions are very distinctly delimited and areolated, the areolæ being strongly convex and often uniformly granular.

The outer angles of the front form distinct little lobules : the fissure in the lower orbital margin, just below the outer angle, is indistinct.

The granules on the wrist are more numerous.

The more convex carapace and the more numerous and more convex areolæ, at once distinguish this species.

In the Indian Museum are 32 specimens from the Andamans, Ceylon up to 34 fms., Persian Gulf, Pedro shoal, and Mergui (besides 13 from Hongkong and 1 from Samoa).

The Indian specimens, especially those from deep water, have the lobules of the carapace more convex than those from Hongkong.

## 125. *Actumnus verrucosus*, Hndrsn.

*Actumnus verrucosus*, Henderson, Trans. Linn. Soc. Zool. (2), V, 1893, p. 364

“The carapace is very convex, covered with a short brown pubescence, and provided with a series of remarkable granulated lobes. The frontal margin is granulated and four-lobed, the rounded prominent submedian lobes separated by a narrow median fissure, the outer lobes of small size. The antero-lateral margin has four prominent, subequal, granulated or subspinose lobes, while the postero-lateral margin is smooth and deeply excavated ; the upper orbital margin is granulated and has two well-marked fissures. The granulated lobes on the carapace are arranged as follows :—On the anterior gastric region, behind the front, two pairs, of which the posterior is much larger ; on the posterior gastric region three lobules, one median and anterior, two posterior ; on each protogastric or lateral gastric region a peculiar Ψ-shaped lobule ; on the cardiac region two lobules which are slightly excavated in the centre ; on the branchial region three lobules, anterior, postero-external (which is the largest of the three), and a postero-internal one placed external to and between the posterior gastric and cardiac lobules.”

“The right cheliped is slightly larger than the left in both sexes ;

both are clothed with a short pubescence on the outer surface of the carpus and hand, except towards the base of the immobile finger. The carpus is sparingly tuberculate externally, with a sulcus running parallel to the articulation with the hand, and separated from the latter by a tuberculated strip: the outer surface of the hand is strongly tuberculate, the tubercles with more or less acute apices, rather closely crowded and without any definite arrangement. The fingers are short, with white and obtuse tips, and the immobile one is placed in a straight line with the lower border of the hand; the dactylus is tuberculated superiorly on its proximal half, and a prominent tooth is present on either finger. The ambulatory legs are simply pubescent. The abdomen is smooth and seven-jointed in both sexes. The external maxillipeds are smooth, with a faint impressed line in the middle of the proximal two-thirds of the ischium. The basal joint of the antennal peduncle is joined to the sub-frontal process, and the terminal joints lie in the orbital hiatus."

"The largest specimen (a male) has the carapace 18.5 mm. long and 25.3 mm. broad."

126. *Actumnus fissifrons*, n. sp.

Carapace and legs covered with a not very dense coat of hairs of two kinds—long and short—the long hairs most numerous on the legs; chelipeds with very little hair.

Carapace strongly convex in all directions,  $\frac{3}{4}$  as long as broad, the regions distinctly delimited and areolated by smooth shallow grooves, the areolæ being slightly convex and more and less granular.

Front not quite a third the greatest breadth of the carapace, deflexed, broadly triangular, the apex with a deep button-hole fissure (the hole at the posterior end), the outer angles separated from the supra-orbital angles by a deepish notch.

Supra-orbital margin thin, sharp, very prominent, deeply fissured near the middle: infra-orbital margin thin, concave, fissured just below the outer angle.

Antero-lateral margin a little shorter than the postero-lateral, cut into three sharp-edged anteriorly-acuminate teeth (exclusive of the outer orbital angle): postero-lateral margin deeply concave.

Chelipeds markedly unequal: upper and outer surfaces of wrists with a few granules, most numerous anteriorly; upper and outer surfaces of both hands—including a great part of the fingers—studded with granules, of which many are enlarged conical or pearl-like, and those along the upper border are spiniform.

Colours in spirit bright orange yellow

Off Ceylon,  $26\frac{1}{2}$ –34 fathoms. Four specimens.

The carapace of the largest specimen is 21 millim. long and 28 millim. broad.

127. *Actumnus tessellatus*, n. sp.

Legs tomentose and hairy, chelipeds inconspicuously tomentose in parts, carapace bare.

The entire dorsal surface of carapace, the upper and outer surfaces of the wrists and the upper surface of the hands, have the form of an elegant mosaic of smooth polygonal tile-like granules in the closest possible contact everywhere.

Carapace strongly convex,  $\frac{3}{4}$  as long as broad, regions well defined and subdivided by broad depressions, the areolæ strongly and somewhat angularly convex.

Front much less than a third the greatest breadth of the carapace; deeply cut into two prominent subfoliaceous median lobes, each of which is flanked externally by a small dentiform lobule.

Orbital margins smooth, not fissured, though there are narrow inconspicuous depressions where the notches exist in other species. The antennary flagellum springs from the orbital hiatus.

Antero-lateral margins thin, sharp, cut into 3 teeth (not including the orbital angle) the last 2 of which are subfoliaceous: postero-lateral margins a little longer than the antero-lateral, markedly concave.

Chelipeds little unequal: in addition to the mosaic ornamentation there are a few scattered pustulous granules on the wrist and upper surface of hand, and all the lower half of the outer surface of the hand is studded with pearl-like or bead-like granules, which are also found on the bases of the fingers.

The legs when denuded are smooth to the naked eye.

Colours in spirit: lavender grey, a good deal suffused with orange-pink, fingers cinnamon.

Carapace 15 millim. long, 20 millim. broad.

A male and a female from the Persian Gulf.

128. *Actumnus arbutum*, n. sp.

Legs with a somewhat scanty growth of hair not concealing their sculpture, chelipeds slightly hirsute in places, carapace bare.

The whole dorsal surface of carapace covered with sharp angular crystalline granules in the closest possible contact: much the same ornamentation is found on the upper and outer surfaces of the wrists and on the upper surface of the hands, the lower half of the outer surface of the hands being studded with pearly and bead-like granules.



Carapace  $\frac{3}{4}$  as long as broad, strongly convex, profusely deeply and symmetrically puckered-areolate.

Front much less than a third the greatest breadth of the carapace, shaped as in *A. tessellatus*, but the edges of the lobes and lobules are crenulate.

Orbits and relations of antennæ as in *A. tessellatus*, but the edges of the orbits are sharply crenulate.

Antero-lateral margin cut into three sharply crenulate granular teeth—not including the orbital angle: postero-lateral margin shorter than the antero-lateral, concave.

Chelipeds a little unequal: fingers granular in the basal half or more.

Carpopodites and propodites of legs, and meropodite of last pair, sharply granular as to the dorsal surface.

Colours in spirit pink, fingers brownish.

Carapace 13.5 millim. long, 18 millim. broad.

A single male from off the coast of Sind, 51 fms.

#### 129. *Actumnus elegans*, de Man.

*Actumnus elegans*, de Man, Journ. Linn. Soc., Zool., XXII. 1887-88, p. 47.

Carapace and exposed surfaces of legs and chelipeds covered with a thickish bright-yellow tomentum, with longer hairs on chelipeds and legs and near frontal margin.

Carapace not much more than  $\frac{2}{3}$  as long as broad, with some scattered comparatively large granules, but with almost no indication of regions; convex fore and aft, slightly so from side to side.

Front about a third the greatest breadth of the carapace, broadly triangular, notched at the apex, not separated from but confluent with the supra-orbital angles. There is a suture line in the lower orbital margin just below the outer angle.

Antero-lateral borders not shorter than the very concave postero-lateral, armed with 7 acute spinuliform granules, in 3 pairs, with an odd one between the first pair and the orbital angle.

Chelipeds unequal: the upper and outer surfaces of wrists and both hands, including a large part of the fingers closely studded with conical white granules.

In the Indian Museum are 2 specimens, one from Mergui the other from Kyuk Phyu Harbour.

This species seems to me to be better placed with *Pilumnus* than *Actumnus*: it and *Pilumnus scabriusculus* White, seem to be very closely related.

130. *Actumnus nudus*, A. M. Edw.

*Actumnus nudus*, A. Milne Edwards, Ann. Soc. Entomol. France, (4) VII. 1867 p. 265 : de Man, Journ. Linn. Soc., Zool., XXII. 1887-88, p. 49, pl. ii. figs. 3, 4.

Carapace almost completely bare, legs with only a few scattered hairs.

Carapace subcircular, convex, regions hardly indicated, studded with pearl-shaped granules in its anterior and antero-lateral parts, twelve of these granules are arranged in an arched line—convex forwards—on either side of the posterior end of the gastric region.

Front much advanced, divided into two rounded oblique lobes, the outer angles of which are hardly separated from the supra-orbital angles.

Antero-lateral border divided into four teeth (not including the outer orbital angle).

Chelipeds unequal; upper and outer surfaces of hand covered with pearly granules, which also exist on the upper surface of the wrist.

Found at Pondicherry and Mergui.

Not represented in the Indian Museum collection.

This species seems to me to be improperly referred to *Actumnus*.

Alliance II. *Heteropanopioidea*.

Heteropanope.

Eurycarcinus.

Nectopanope.

## HETEROPANOPE, Stimpson, de Man.

*Heteropanope*, (part) Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 35.

*Heteropanope*, (part) A. Milne Edwards, Ann. Sci. Nat., Zool., (4) XX. 1863, pp. 288, 289.

*Pilumnopeus*, (part) A. Milne Edwards, loc. cit.; and Ann. Soc. Entomol. France, (4) VII. 1867, p. 277.

*Heteropanope*, de Man, Journ. Linn. Soc., Zool., XXII. 1887-88, p. 52.

Carapace moderately broad, moderately or little convex, with the regions little or hardly demarcated.

Antero-lateral borders shorter than the postero-lateral, cut into four lobes or teeth, of which the first is confluent with the outer angle of the orbit: postero-lateral borders moderately convergent, posterior border rather long.

Front moderately broad, between a fourth and a third the greatest breadth of the carapace, cut into two lobes, the outer angle of each of which is dentiform and separated from the supra-orbital margin by a notch.

A small triangular gap in the orbital margin just beneath the outer angle. The antennules fold nearly transversely.

Basal antennal joint short, not reaching the front; the flagellum, which is about equal in length to the major diameter of the orbit, lodged in the rather broad orbital hiatus.

The ridges of the endostome, defining the expiratory canals, are well marked, but the anterior border of the merus of the external maxillipeds is not notched. The buccal cavern is broader anteriorly than posteriorly.

Chelipeds unequal in both sexes; fingers rather short, pointed, not hollowed.

The abdomen of the male consists of seven separate segments.

*Heteropanope* closely resembles *Panopeus* (e.g. *P. herbstii*), but differs in having the crests of the endostome much more distinct, and all seven segments of the male abdomen separate.

*Key to the Indian species of Heteropanope.*

- I. Carapace decidedly convex, both chelipeds perfectly smooth to the naked eye ..... *H. lewis*.
- II. Carapace almost flat, wrist and hand of smaller cheliped studded with vesiculous or pearly granules..... *H. indica*.

131. *Heteropanope indica*, de Man.

*Heteropanope indica*, de Man, Journ. Linn. Soc., Zool., XXII. 1887-88, p. 53, pl. iii. figs. 1, 2.

Carapace more than two-thirds as long as broad, very little convex, surface somewhat granular and scantily tomentose near the margins. Gastric region and its three sub-regions faintly indicated. Two series, starting respectively from the 3rd and 4th teeth of the antero-lateral margins, of discontinuous wavy finely granular ridges cross the carapace transversely, fairly parallel with the common curve of the frontal and antero-lateral borders.

The finely granular orbital margin has the two grooves near the external angle, and the gap just below the external angle, distinct.

Antero-lateral border cut into four teeth, of which the first two are broad thin and compressed and the last two pointed and subpyramidal; the edges of all are finely granular.

Chelipeds and legs more or less tomentose. Chelipeds very unequal; a curved spine-like tooth at distal end of upper border of arm, and a spine at inner angle of wrist: upper and outer surface of smaller hand and wrist studded with vesiculous granules; larger hand quite smooth, very large, little shorter than the greatest breadth of the carapace.

Colours in spirit, dull earthy brown with a greenish tinge.  
In the Indian Museum is a single specimen, from Mergui.

132. *Heteropanope lævis* (Dana).

*Panopæus lævis*, Dana, Proc. Ac. Nat. Sci. Philad. 1852, p. 76, and U. S. Expl. Exp. Crust. pt. I. p. 180, pl. viii. figs. 13a-c: J. E. Benedict and M. J. Rathbun, P. U. S. Nat. Mus., XIV. 1891, p. 380.

Carapace two-thirds as long as broad, decidedly convex fore and aft, its surface perfectly smooth to the naked eye, and bald. The gastric region and its three sub-regions are as faintly as possible indicated, and the two broken series of transverse elevations present in *H. indica* are also present, but are much blunter smoother and fainter. The orbits are as in *H. indica*, but the margin is but microscopically granular.

The antero-lateral border is cut into four teeth, all of which are thin and compressed, and all but the first are sharply acuminate forwards.

The chelipeds are extremely unequal, and are perfectly smooth and bare: there is a denticle at the distal end of the upper border of the arm, and a stout sharp tubercle (often double-crowned) at the inner angle of the wrist. The greatest length of the larger hand, in the male, is about equal to the greatest breadth of the carapace, and its greatest height more than three-quarters the greatest length of the carapace: in the female this hand is not quite so large.

The edges of the last four joints of all the legs are scantily hairy in the male, but more profusely so in the female.

Colours in spirit; brownish yellow or dull green.

In the Indian Museum are 17 specimens from Karáchi and one from Bombay.

133. *Heteropanope eucratoides*, Stimpson.

*Heteropanope eucratoides*, Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 35: de Man, Journ. Linn. Soc., Zool., XXII. 1887-88, p. 56, pl. iii. figs. 3, 4.

This species is included by de Man in the Mergui fauna. There are no specimens in the Indian Museum. According to de Man it chiefly differs from *H. indica* in having the antero-lateral margins much shorter, and the 3rd tooth of the antero-lateral margin smaller than any of the others.

The chelipeds have a smooth surface.

EURYCARCINUS, A. Milne Edwards.

*Eurycarcinus*, A. Milne Edwards, Ann. Soc. Entomol. France (4) VII. 1867, p. 276.

*Eurycarcinus*, de Man, Journ. Linn. Soc., Zool., XXII. 1887-88, p. 43.

Carapace broad, convex, perfectly smooth, without trace of regions.

Antero-lateral borders very much shorter than the postero-lateral, cut into four lobes or teeth, of which the first is confluent with the outer angle of the orbit: postero-lateral border moderately convergent, posterior border rather long.

Front broadish, nearly a third the greatest breadth of the carapace, obliquely deflexed, projecting a little beyond the orbits, straight and square cut, commonly emarginate in the middle line.

Orbits shallow, affording little concealment to the eyes, the upper margin entire, a gap in the lower margin, below the outer angle. The antennules fold quite transversely.

Basal antennal joint short, not reaching the front, the flagellum, which is long (much longer than the major diameter of the orbit), lodged in the orbital hiatus.

The ridges of the endostome, defining the expiratory canals, are well pronounced, but the anterior border of the merus of the external maxillipeds is not notched. Buccal cavern wider anteriorly than posteriorly.

Chelipeds unequal in both sexes, fingers pointed, not hollowed.

The abdomen of the male is seven-jointed.

*Eurycarcinus* is very closely related to *Heteropanope*, but is easily distinguished by the broad smooth convex carapace, the shallow and rather elongate orbits, and the very short antero-lateral margins.

#### *Key to the Indian species of Eurycarcinus.*

I. Thumb of the larger cheliped with a much-enlarged tooth at basal end:—

1. Antero-lateral border less than  $\frac{1}{2}$  the length of the postero-lateral ..... *E. orientalis*.
2. Antero-lateral border at least  $\frac{1}{2}$  the length of the postero-lateral ..... *E. maculatus*.

II. Thumb of the larger cheliped without a much-enlarged tooth at base ..... *E. grandidieri*.

#### 134. *Eurycarcinus orientalis*, A. Milne Edwards.

*Eurycarcinus orientalis*, A. Milne Edwards, Ann. Soc. Entom. France (4) VII. 1867, p. 277: de Man, Notes Leyden Mus. XIV. 1892, p. 226.

Carapace rather over two-thirds as long as broad, perfectly smooth (except for an extremely fine and faint granular ridge that runs transversely inwards towards the gastric region from the last tooth of the antero-lateral margin), decidedly convex fore and aft and slightly so from side to side.

Front cut quite straight and square, slightly emarginate in the middle line.

Antero-lateral border cut into four thin shallow teeth, of which the first two are rounded and the last two are anteriorly acuminate, the first being the least prominent of all and the last being the smallest of all. The antero-lateral border is extremely short, a good deal less than two-thirds the length of the postero-lateral.

Supra-orbital margin entire, the infra-orbital finely denticulate.

Chelipeds markedly unequal, perfectly smooth, inner angle of wrist rather strongly pronounced; the hand and fingers are rather short and stout and the thumb of the larger cheliped is a good deal shorter than the hand and has a very strong tooth at its base.

The legs and under surface of the body are covered with a dense, extremely short scurfy tomentum.

Colours in spirit yellowish brown.

In the Indian Museum are four specimens, from Karachi, Bombay and the Andamans.

This species agrees in all respects with the descriptions and figures of *Eurycarcinus maculatus*, except in respect of the antero-lateral borders. These are so short that a line joining their posterior extremities would divide the carapace into two halves, of which the anterior would be much the smaller: the teeth of the antero-lateral border are also much shallower and less salient.

135. *Eurycarcinus grandidieri*, A. Milne Edwards.

*Eurycarcinus grandidieri*, A. Milne Edwards, Ann. Soc. Entom. France, (4) VII. 1867, p. 277; and Nouv. Archiv. du Mus. IV. 1868, p. 80, pl. xix. figs. 13-16.

Carapace about two-thirds as long as broad, strongly convex fore and aft, slightly so from side to side, perfectly smooth to the naked eye.

Front cut square, emarginate in the middle line, the fore edge straight but sloping a little obliquely from the outer angles to the middle line. Supra-orbital margin entire, the infra-orbital obscurely denticulate.

Antero-lateral border as in *E. orientalis* but rather longer, its length being at least two-thirds that of the postero-lateral; the edges of all the teeth are a little thickened and granular.

Chelipeds unequal, perfectly smooth, inner angle of wrist pronounced: the hand is more elongate and narrower and the fingers are slenderer than in *E. orientalis*, and the thumb of the larger cheliped has no enlarged tooth at the base. The legs, the smaller cheliped, and the under surface of the body are covered with a dense, extremely short and fine tomentum.

Colours in spirit, yellowish brown.

In the Indian Museum is a single specimen from the Nicobars.

The chief difference between this species and *E. orientalis* and *maculatus* appears to be in form of the hand and fingers of the larger cheliped.

136. *Eurycarcinus maculatus*, (A. M. Edw.) de Man.

*Pilumnopeus maculatus*, A. Milne Edwards, Ann. Soc. Entom. France, (4) VII. 1867, p. 277; and Nouv. Archiv. du Mus. IV. 1868, p. 82, pl. xix. figs. 17-19.

*Eurycarcinus maculatus*, de Man, Journ. Linn. Soc. XXII. 1887-88. p. 44, pl. ii. figs. 2 and 3 (not 3 and 4).

The Mergui specimen described by de Man does not appear to be in the Indian Museum.

This species agrees with *E. orientalis* in the form of the chelipeds (hand and thumb), and appears to differ from that species only in having a longer and more deeply cut-up antero-lateral border.

NECTOPANOPE, Wood-Mason.

*Nectopanope* Wood-Mason, Ann. Mag. Nat. Hist. March, 1891, p. 261.

Carapace broad, approaching the quadrilateral, convex fore and aft, the branchial regions so inflated and convex dorsally as to make the transverse plane of the carapace strongly concave in the middle line, the other regions obscurely defined, the surface smooth.

The antero-lateral borders are very much shorter than the postero-lateral, are very thin and sharp, and are cut into teeth of which the first is confluent with the outer orbital angle.

Front broad, a third the greatest breadth of the carapace, straight, square cut, slightly projecting beyond the supra-orbital angle, from which it is sharply cut off by an angular notch, on either side.

Orbits large, with a thin, sharp, prominent margin; a notch internal to the middle of the upper margin, the notch breaking this margin into two curves, one corresponding to the eye-stalk the other to the cornea: eyes large, reniform, on moderately stout stalks.

Antennules folding transversely. The basal antennal joint is very short, but almost touches the turned down side-edge of the front: the flagellum, which is considerably longer than the major diameter of the large orbit, springs from the rather broad orbital hiatus.

The buccal cavern is broader anteriorly than posteriorly, and the mouth parts do not nearly reach its front edge, so that a wide and permanent gap is left: the crests of the endostome are not very strong, but the free edge of the endostome corresponding to the efferent branchial channel, on either side, is deeply excavated. The outer wall of the efferent branchial canal forms a strong angular bulge in the pterygostomial region.

The chelipeds in the female are equal; the fingers are compressed and pointed, not hollowed.

The legs are long and slender, the propodite and dactylus of the last pair strongly compressed and a little broadened.

This form is most nearly related to *Eurycarcinus*.

137. *Nectopanope rhodobaphes*, Wood-Mason.

*Nectopanope rhodobaphes*, Wood-Mason, Ann. Mag. Nat. Hist. March, 1891, p. 261.

Carapace about  $\frac{3}{4}$  as long as broad. Front extremely obscurely grooved in the middle line. Antero-lateral border cut into three thin sharp-edged teeth, of which the first is broad and rounded and confluent with the orbit, the second is broad and anteriorly acuminate, and the third almost spiniform.

Chelipeds smooth, in the female they are equal and are a little over  $1\frac{1}{4}$  times the length of the carapace: arm with an acute spine near the far end of the upper border; inner angle of wrist acute, spiniform; fingers thin, compressed, pointed and hooked at tip, armed with thin laciniate teeth, the thumb very broad.

Legs thin, the first three pairs not much shorter than the chelipeds, with long compressed-styliform dactylus: the last pair a good deal shorter, with thin blade-like propodite and dactylus closely fringed with hair.

Colours in spirit uniform yellowish white: in life pink, with a dotted, V-shaped, white mark between the gastric and branchial regions.

In the Indian Museum is a single female specimen from off the Godávari coast 98-102 fms.

*Nectopanope longipes*, which was referred provisionally to this genus by Wood-Mason, who had insufficient material for examination, turns out, now that numerous good specimens have been dredged by the "Investigator," to be a *Catometope*.

Subfamily VII. ERIPHINÆ.

Alliance I. *Eriphioida*.

ERIPHIA, Latr.

*Eriphia*, Latreille, Cuvier Règne An. (1) III. 18.

*Eriphia*, Desmarest, Consid. Gen. Crust. p. 125.

*Eriphia*, De Haan, Faun. Japon. Crust. p. 22.

*Eriphia*, Milne Edwards, Hist. Nat. Crust. I. 425.

*Eriphia*, Dana, Silliman's Journ. (2) XII. 1851, p. 128; and U. S. Expl. Exp. Crust. pt. I. p. 246.

*Eriphia*, Heller, Crust. Sudl. Europ. p. 74.



*Eriphia*, A. Milne Edwards, and Miss. Sci. Mex. Crust. p. 337.

*Eriphia*, Miers, Challenger Brachyura p. 162.

Carapace thick and deep, approaching a quadrilateral shape, very little convex or nearly flat, not remarkably broader than long, the regions except the gastric not demarcated.

Antero-lateral borders slightly curved, much shorter than the postero-lateral and meeting the latter, not at a strong angle as in most Cancrids, but at a very open and imperceptible angle; though spinate they are not cut into lobes.

The fronto-orbital border is extremely broad, much more than three-quarters the greatest breadth of the carapace; the front, which is therefore broad also, is strongly deflexed, is almost straight, and is cut into two broad lobes the outer part of each of which is broadly in contact—far beyond the limits of the antennal base—with a singularly broad prolongation of the infra-orbital plate. \* The orbits, which are deep and oval, are therefore completely closed and widely separated from the antennæ.

The basal antennal joint is very small short and broad; the flagellum is long, more than the major diameter of the large orbit. The antennules fold transversely.

The crests of the endostome, defining the expiratory canals, are strong, and the canal is completed below by the foliaceous process of the first maxillipeds, the anterior edge of that process being concave. The oblique anterior border of the merus of the external maxillipeds is not notched.

Chelipeds massive, unequal in both sexes; fingers stout, pointed, not hollowed.

The abdomen of the male has all 7 segments separate.

#### Key to the Indian species of *Eriphia*.

- I. Carapace nearly  $\frac{3}{4}$  as long as broad, devoid of hair dorsally; front cut into blunt teeth:—
  1. Chelipeds smooth to the naked eye ..... *E. lævimana*.
  2. Hand and wrist of the smaller cheliped studded with tubercles ..... *E. smithii*.
- II. Carapace only  $\frac{2}{3}$  as long as broad, with numerous scattered hairs; front not cut into teeth ..... *E. scabricula*.

#### 138. *Eriphia lævimana*, Latr. Edw.

*Eriphia lævimana*, Guérin, Icon. R. A., Crust. pl. iii. fig. 1: Milne Edwards, Hist. Nat. Crust. I. 427: Dana, U. S. Expl. Exp. Crust. pt. I. p. 249, pl. xiv. figs. 7a-c: Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 37: A. Milne Edwards, in Maillard's l'île Réunion, Annexe F. p. 5, and Nouv. Archiv. du Mus. IV. 1868, p. 71, and IX. 1873, p. 255: Heller, Novara Crust. p. 24: Hilgendorf in v. d. Decken's

Reisen Ost-Afr. III. i. p. 75, and MB. Ak. Berl. 1878, p. 797: Miers, P. Z. S. 1877, p. 135, and Ann. Mag. Nat. Hist. (5) V. 1880, p. 237, and Zool. H. M. S. Alert, pp. 517, 534, and Challenger Brachyura, p. 162: Tozzetti, Magenta Crost. p. 60, pl. v. figs. 1a-c: E. Nauck, Zeits. Wiss. Zool. XXXIV. 1880, p. 58 (gastric teeth): Richters in Möbius Meeresf. Maurit. p. 151: Haswell, Cat. Austral. Crust. p. 75: Müller, Verh. Ges. Basel VIII. 1886, p. 475: de Man, Journ. Linn. Soc., Zool., XXII. 1887-88, p. 68, and Archiv. f. Naturges. LIII. 1887, i. 327, and Zool. Jahrb. Syst. &c. VIII. 1894-95, p. 555: Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 367: Ortman, Zool. Jahrb., Syst., VII. 1893-94, p. 480, and in Semon's Forschungar. (Jena. Denk. VIII) Crust. p. 54: Zehntner, Rev. Suisse Zool. II. 1894, p. 161: Whitelegge, Mem. Austral. Mus. III. 1897, p. 137.

*Eriphia trapeziformis*, Hess, Archiv. für Naturges. XXXI. 1865, i. pp. 135, 171, pl. vi. fig. 4 (see de Man, Zool. Jahrb., Syst., II. 1887, p. 695).

Carapace nearly  $\frac{4}{5}$  as long as broad: gastric region large, well demarcated and subdivided into three large subregions, its anterior part, like the anterior part of the branchio-hepatic regions, covered with small pearly and subsquamiform tubercles; the rest of the carapace smooth, but closely covered with very small vesiculous granules not plainly visible to the naked eye: the post-orbital groove is distinct, and behind it, parallel with the gastric region, on each side a small narrow areola is marked off.

The free edge of the frontal lobes is bluntly spinate: there is a blunt spine also at the lower inner angle of the orbit, and two or three at the outer angle of the orbit: and there are 5 or 6 blunt spines or spinules of decreasing size along the antero-lateral border.

Chelipeds almost smooth to the naked eye, though closely covered with small depressed vesiculous granules under the lens: upper border of arm denticulate at its distal end, where also the granules on the neighbouring part of the outer surface are plainly visible without a lens; the anterior border of the arm denticulate at its proximal end. The upper part of the inner surface of the wrist forms a distinct facet, the proximal angle of which is pronounced and the distal end of which is bounded by two or three blunt spines.

Legs stout, smooth; upper edge of merus denticulate and somewhat hairy, the lower edge with tufts of stiff hair: similar tufts of hair along upper edge of carpus and on all the edges and surfaces of the propodite; the greater part of the dactylus covered with short stiff hairs and longer bristles.

Colours in spirit dull maroon, with a bluish-green tinge on the postero-lateral parts of the carapace and on the walking-legs.

In the Indian Museum are 53 specimens, from the Andamans, Arakan coast, Mergui, Ceylon and Laccadives (besides 2 from Samoa).

139. *Eriphia laevimana* var. *Smithii*, Macleay, Hilgdf.

*Eriphia smithii*, Macleay, Ill. Ann. S. Afr. p. 60 : Krauss, Sudafr. Crust. p. 86, pl. ii. fig. 3 : Dana, U. S. Expl. Exp. Crust. pt. I. p. 251 : Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 37 : A. Milne Edwards, Nouv. Archiv. du Mus. IV. 1868, p. 71 : Hoffmann in Pollen and Van Dam, Faun. Madagasc., Crust. p. 6, pl. i. figs. 1a-c : Lenz and Richters, Abh. Senck. Ges. XII. 1881, p. 422 : Ortmann in Semon's Forschungsr. (Jena. Denk. VIII) Crust. p. 54.

*Eriphia laevimana* var. *smithii*, Hilgendorf MB. Ak. Berl. 1878, p. 797 : Miers, Ann. Mag. Nat. Hist. (5) V. 1880, p. 237, and Zool. H. M. S. Alert, pp. 517, 535 : de Man, Archiv. f. Naturges. LIII. 1887, i. p. 327 : ? ? Cano, Boll. Soc. Nat. Napoli, III. 1889, p. 210 : A. O. Walker, Journ. Linn. Soc., Zool., XX. 1886-90, p. 110 : Ortmann, Zool. Jahrb., Syst., VII. 1893-94, p. 481.

The variety *Smithii* differs from the typical *Eriphia laevimana* only in the sculpture of the chelipeds.

The upper and outer surfaces of the wrists and hands of the smaller cheliped are closely covered with miliary granules and are profusely studded with salient and subsquamous tubercles, which, on the lower half of the hand are arranged in longitudinal series.

The wrist and hand of the larger cheliped may be nearly smooth or may have a few scattered pustulous tubercles (as they are in most Indian specimens), or they may more nearly resemble the smaller cheliped in sculpture.

In the Indian Museum are 15 specimens from Karáchi, and one from the Mekran coast.

140. *Eriphia scabricula*, Dana.

*Eriphia scabricula*, Dana, Proc. Ac. Nat. Sci. Philad. 1852, p. 82, and U. S. Expl. Exp. Crust. pt. I. p. 247, pl. xiv. figs. 5a-b : Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 37 : A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 256 : Hilgendorf, MB. Ak. Berl. 1878, p. 798 : Richters in Möbius Meeresf. Maurit. p. 151 : Lenz and Richters, Abh. Senck. Ges. XII. 1881, p. 422 : Miers, Zool. H. M. S. "Alert," pp. 518, 535 : de Man, Notes Leyden Mus. XII. 1890, p. 66, and Zool. Jahrb., Syst., VIII. 1895, p. 555 : Ortmann, Zool. Jahrb., Syst., VII. 1893-94, p. 480 : Whitelegge, Mem. Austral. Mus. III. 1897, p. 137.

*Eriphia gonagra*, Krauss (nec Edw.) Sudafr. Crust. p. 36.

Carapace  $\frac{3}{4}$  as long as broad, grooved on the surface as in *E. laevimana*, closely covered anteriorly and laterally with sharpish subsquamiform granules among which are numerous soft but stiffish hairs.

Free edge of frontal lobes entire, microscopically beaded. A sharp tooth at the outer angle of the orbit only. Antero-lateral border with 4 or 5 sharp teeth of gradually decreasing size.

Upper and outer surfaces of wrists and hands closely covered with vesiculous granules and sharpish pearly tubercles with numerous hairs

between them, the tubercles on the smaller hand being in longitudinal series and the hairs thick there.

Legs smooth; the borders of the last four joints, specially the upper border, fringed with longish hairs.

Colours in spirit, warm light brown, the legs in good specimens cross-banded alternate dark and light brown.

In the Indian Museum are three specimens, from the Laccadives, the Andamans and Ceylon, (also one from Samoa)

#### Alliance II. Trapezioidea.

Trapezia.      Tetralia.      Quadrella.      Sphenomerus.

#### TRAPEZIA, Latreille.

*Trapezia*, Latreille, Fam. Nat. p. 269, and Encyclop. Meth. x. 695.

*Trapezia*, Milne Edwards, Hist. Nat. Crust. I. 427.

*Trapezia*, Dana, Silliman's Journ. (2) XII. 1851, p. 128, and U. S. Expl. Exp. Crust. I. p. 253.

*Trapezia*, A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 257 and Miss. Sci. Mex., Crust. p. 341.

*Trapezia*, Miers, Challenger Brachyura, p. 163.

*Trapezia*, Ortmann, Zool. Jahrb., Syst., X. 1897, p. 202.

*Grapsillus*, Macleay in Smith's Ill. Zool. S. Afr. p. 67.

Carapace approaching the quadrilateral, little convex, not much broader than long, smooth and without any trace of regions.

Antero-lateral borders much shorter than the postero-lateral, running backwards almost straight and parallel with one another, not therefore meeting the convex curved and convergent postero-lateral borders at any angle.

Fronto-orbital border extremely broad, about as extensive as the greatest breadth of the carapace. Front broad, horizontal, lamellar separated from the supra-orbital angle by a notch; cut into two lobes, of which both the inner and outer angles are pronounced: so that with the supra-orbital angle the front usually appears 6-toothed.

The orbits, which afford no concealment to the eyes and are large, are cut out of the antero-lateral angles of the carapace: their dentiform upper and lower inner angles are broadly in contact, so that the antennæ are widely excluded from the orbit: their margins are without fissures or sutures.

The antennules fold nearly transversely, but in most spirit specimens are extended beyond their fossæ. The basal antennal joint is slender and very short and does not nearly reach the front: the flagellum is very long, much longer than the major diameter of the orbit.

The crests of the endostome, defining the expiratory canals, are well developed and the canals are closed in below by the foliaceous process of the 1st maxillipeds: the anterior edge of the merus of the rather slender external maxillipeds is not notched.

The chelipeds are long and very massive and are sub-equal or not very unequal in both sexes: the arm usually projects a long way beyond the carapace, and has its anterior edge sharp and crest-like and serrate: the fingers have usually a thin and sharp cutting-edge, best marked on the immobile finger. Legs stout, of moderate length.

The abdomen of the male consists of 5 segments, the 3rd-5th being fused.

The species of *Trapezia* are found in the crevices of coral-stocks.

### Key to the Indian species of *Trapezia*.

- I. A distinct spine or tooth at the junction of the antero-lateral and postero-lateral borders of the carapace:—
  - i. Lower border of hand sharp, entire:—
    1. Outer surface of hand, in its upper part at least, covered with a mass of fine tangled downy hairs ..... *T. cymodoce*.
    2. Outer surface of hand smooth and bald:—
      - a. Carapace and appendages plain yellowish or reddish brown ..... *T. ferruginea*.
      - b. Carapace (and sometimes also the upper surface of the hands) covered with an elegant meshwork of fine dark brown lines (a scurfy pubescence on outer surface of hand, occasionally) .. ..... *T. areolata*.
      - c. Carapace and appendages everywhere covered with roundish red spots ..... *T. maculata*.
      - d. Carapace covered with faintish brown spots, upper surface of hands with a network of brown lines ... *T. intermedia*.
  - ii. Lower border of hand granular or bluntly serrulate: carapace, etc. covered with roundish red spots ..... *T. rufopunctata*.
- II. Nothing more than an indistinct notch at the junction of the antero-lateral and postero-lateral borders: colours, in spirit, blackish brown..... *T. digitalis*.

With the species of *Trapezia* the citations of the various writers are so extremely uncertain that I have given up the attempt to make them complete.

Ortmann, in *Zoologische Jahrbücher, Abth. für Systematik, etc.* X. ii. 453

1897, pp. 201-216, has published a little monograph of the group, in which full lists of citations will be found.

141. *Trapezia cymodoce*, (Herbst) Miers, de Man, Ortmann.

*Cancer cymodoce*, Herbst, Krabben III. ii. 22, pl. li. fig. 5.

*Trapezia cymodoce*, Savigny and Audouin, Descr. de l'Egypte, Crust. p. 85, pl. v. fig. 2: Miers, Ann. Mag. Nat. Hist. (5) II. 1878, pp. 408, 409: de Man, Notes Leyden Mus. II. 1880, pp. 177, 178, and Journ. Linn. Soc., Zool., XXII. 1887-88, p. 69: Ortmann, Zool. Jahrb., Syst. X. 1897, pp. 203, 204.

*Trapezia hirtipes*, Lucas in Jacquinot's Voy. Astrolabe, Zool. III. Crust. p. 44 pl. iv. fig. 14.

*Trapezia cærulea*, Heller, SB. Ak. Wien, XLIII. 1861, p. 348.

*Trapezia dentata*, A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 261.

Carapace four-fifths as long as broad, slightly convex in both directions in the adult female, almost flat in the male, smooth and polished.

Front prominent beyond the supra-orbital angle, rather deeply cut into two lobes, each of which has the inner angle dentiform and still further prominent, and the outer angle (though rounded) sharply marked and separated by a deep notch from the dentiform supra-orbital angle.

Inner angle of lower edge of orbit acutely spiniform: outer angle of orbit acute.

Antero-lateral borders nearly parallel with one another or very slightly curved outwards, an acute procurved spine marks their junction with the postero-lateral borders.

Chelipeds sub-equal in both sexes: more than  $2\frac{3}{4}$  times the length of the carapace in the adult male but not quite so long in the female: the arm, which projects far beyond the edge of the carapace, has the anterior border foliaceous and cut into numerous sharp teeth: inner angle of wrist sharp and prominent, but not usually spiniform: hands long and compressed, the upper and lower edges (especially the lower) both sharp, the upper part of the outer surface of the hand (and wrist also, in many cases) covered with silky wool; fingers compressed, the cutting-edges thin sharp and not much toothed.

Legs smooth, the dactylus with rather numerous silky bristles, which are also found scattered along both edges of propus and upper edge of carpus.

Colours in spirit yellowish or reddish brown, often very dark or livid on the carapace; distal two-thirds of fingers commonly dark brown.

In the Indian Museum are 37 specimens, from the Andamans, Nicobars, Mergui, Palk Straits and the Mekran coast (besides 16 from other parts of the Indo-Pacific).

In some specimens the free edge of the frontal lobes is more or less crenulate: the outer angle of the orbit and the lateral epibranchial spine are sometimes blunt: the whole of the outer surface of the hand is sometimes pubescent, and the arm also.

The species can, however, always be recognized by the uniform colouration, the hairy outer surface of the hands, and the very prominent front.

142. *Trapezia ferruginea*, Latr., Miers, de Man, Ortmann.

*Trapezia ferruginea*, Latreille, Encycl. Meth. X. p. 695: Milne Edwards, Hist. Nat. Crust. I. 429: Heller, SB. Ak. Wien, XLIII. 1861 p. 349, pl. iv. fig. 40: Miers, Ann. Mag. Nat. Hist. (5) II. 1878, pp. 407, 408: de Man, Notes Leyden Mus. II. 1880, pp. 178, 179: Ortmann, Zool. Jahrb. Syst., X. 1897, pp. 202, 205.

*Grapsillus subinteger*, Macleay in Smith's Ill. Zool. S. Afr., Annulosa, p. 67.

*Trapezia cymodoce*, Dana, U. S. Expl. Exp. Crust. pt. I. 257, pl. xv. fig. 5, A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 260, and Miss. Sci. Mex. Crust. p. 342.

*Trapezia miniata*, Lucas in Jacquinot's Voy. Astrolabe, Zool. III. Crust. p. 43, pl. iv. fig. 10.

*Trapezia subdentata*, Gerstaecker, Archiv. für Naturges. XXII. 1856, i. p. 127.

Differs from *T. cymodoce*, which it closely resembles in form and colour, in the following particulars:—

(1) the front as a whole is not so prominent, and its constituent teeth, as well as the supra-orbital angle, are not so prominent, and deep-cut: the tooth at the lower inner angle of the orbit is not so sharp:

(2) the outer angle of the orbit and the lateral epibranchial spine are not nearly so spiniform in the adult:

(3) the upper border of the hand is not so sharp, and the outer surface of the hand is smooth, polished and quite hairless.

In the Indian Museum are 25 specimens, from the Andamans, Nicobars and Ceylon.

*Trapezia ferruginea* var. *intermedia*, Miers.

*Trapezia rufopunctata* var. *intermedia*, Miers, Challenger Brachyura, p. 163, pl. xii. fig. 2, 1886.

*Trapezia*, sp. Richters in Möbius, Meeresf. Maurit. p. 152, pl. xvi. fig. 13, 1880.

Differs from *T. ferruginea* only in colouration.

The carapace, legs, arms and wrists are covered with light brown rather blotchy spots, while the upper surface of the hands is marked by a network of fine brown lines.

*Trapezia ferruginea* var. *guttata*, Rüpp.

Carapace light brown, edge of front brick-red: chelipeds with a network of fine pinkish-brown lines: legs with small pink spots.

Twelve specimens have just been dredged by Dr. A. R. S. Anderson of the "Investigator," off Great Coco I. (Andamans).

A faded specimen could not be distinguished from *T. ferruginea*.

In the Indian Museum are 3 specimens, from Diamond Island (off C. Negrais, Burma).

The Museum also possesses one of the "Challenger" duplicates from Honolulu.

143. *Trapezia ferruginea* var. *areolata*, Dana.

*Trapezia areolata*, Dana, Proc. Acad. Nat. Sci. Philad. 1852, p. 83, and U. S. Expl. Exp. Crust. pt. I. p. 259, pl. xv. figs. 8a-b and 9; Heller, Novara Crust. p. 25; de Man, Archiv. für Naturges. LIII. 1887, i. p. 317, and Zool. Jahrb. Syst. VIII. 1894-95, p. 556; Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 366; Ortmann, Zool. Jahrb. Syst. VII. 1893-94, p. 485.

*Trapezia reticulata*, Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 37.

*Trapezia areolata* var. *inermis*, A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 259, pl. x. fig. 6; Miers, Challenger Brachyura, p. 167; Zehntner, Rev. Suisse Zool. V. 1894, p. 157.

*Trapezia ferruginea areolata*, Ortmann, Zool. Jahrb., Syst., X. 1897, pp. 203, 206.

This species also differs from *T. ferruginea* only in colouration.

The carapace, and sometimes also the upper surface of the chelipeds, is covered by a very elegant honeycomb network of fine brown (in spirit) lines. Even in old spirit specimens this network can be made out, with a lens, on the carapace, though not on the chelipeds.

In many specimens of *T. areolata*, the upper part of the outer surface of the hand is covered with a very fine scurf-like pubescence.

In the Indian Museum are 52 specimens, from the Andamans, Nicobars, Ceylon and Mergui (besides 3 from other parts of the Indo-Pacific).

144. *Trapezia maculata* (Macleay) Dana.

*Grapsillus maculatus*, Macleay in Smith's Ill. Zool. S. Afr., Ann. p. 67.

*Trapezia tigrina*, Eydoux and Sonleyet, Voy. Bonite, Vol. I. p. 232, pl. ii. fig. 4.

*Trapezia maculata*, Dana. U. S. Expl. Exp. Crust. pt. I. p. 256, pl. xv. figs. 4a-d; Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 37, and Ann. Lyc. Nat. Hist., N. York, VII. 1862, p. 219; Streets, Bull. U. S. Nat. Mus. VII. 1877, p. 106; de Man, Archiv. für Naturges. LIII. 1887, i. p. 318, pl. xiii. fig. 2; J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 366.

*Trapezia rufopunctata* var. *maculata*, Miers, Phil. Trans. Roy. Soc., Vol. 168, 1879, p. 487; Ortmann, Zool. Jahrb., Syst. VII. 1893-94 p. 484.

*Trapezia ferruginea maculata*, Ortmann, Zool. Jahrb., Syst., X. 1897, pp. 203, 206.

Differs from *T. cymodoce* in the following particulars:—

(1) the front as a whole is not so prominent, nor are its constituent teeth and the supra-orbital angle quite so deep-cut:

(2) the chelipeds are not much more than twice the length of the carapace in the male, the arm being shorter than in *T. cymodoce* and *ferruginea*; there is a strong spine at the inner angle of the wrist; the outer surface of the hand is smooth, polished and hairless:



(3) the carapace, chelipeds, legs, etc., are everywhere covered with well defined roundish red spots.

*N.B.* The lower border of the hand is sharp and entire (non-granular, non-serrulate).

In the Indian Museum are four specimens from Table Island (north of the Andamans).

#### 145. *Trapezia rufopunctata* (Herbst) Latr., Ortmann.

*Cancer rufopunctatus*, Herbst, Krabben III. i. 54, pl. xlvii. fig. 6.

*Trapezia rufopunctata*, Latreille, Encyclop. X. p. 695 : Dana, U. S. Expl. Exp., Crust. pt. I. p. 255, pl. xv. figs. 3a-b : Lucas in Jacquinot's Voy. Astrolabe, Zool. III. Crust. p. 41, pl. iv. fig. 8 : Gerstaecker, Archiv. für Naturges. XXII. 1856, i. p. 123 : Heller, SB. Ak. Wien, XLIII. 1861, p. 350 : A. Milne Edwards, Nouv. Archiv. du. Mus. IV. 1868, p. 71, and IX. 1873, p. 258, and Miss. Sci. Mex. Crust. p. 342 : Hilgendorf in v. d. Decken's Reisen Ost-Afr. III. i. p. 75, pl. ii. fig. 3 : Kossman, Reise roth. Meer., Crust. p. 42 : Miers, Challenger Brachyura, p. 167 : de Man, Archiv. für Naturges. LIII. 1887, i. p. 318, pl. xiii. figs. 1, 2 : J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 366 : Ortmann, Zool. Jahrb., Syst. VII. 1893-94, p. 484, and X. 1897, pp. 205, 207, and in Semon's Forschungen. (Jena. Denk. VIII.) Crust. p. 52 : Zehntner, Rev. Suisse Zool. II. 1894, p. 157.

*Trapezia acutifrons*, A. Milne Edwards, Ann. Soc. Entom. France, (4) VII. 1867, p. 281.

Differs from *T. cymodoce* as follows :—

(1) though the front is of the same general form, the edge of each frontal lobe is somewhat angularly excised and the outer angle is angularly acute (not rounded) and is produced to or even beyond the level of the dentiform inner angle of each lobe :

(2) the inner angle of the wrist is more acute and spiniform, the upper border of the hand is rounded and the outer surface smooth polished and hairless, and the lower border of the hand is granular or bluntly serrulate :

(3) the carapace, chelipeds and legs are covered with rather large red spots.

In the Indian Museum are 5 specimens from Ceylon.

#### 146. *Trapezia digitalis*, Latr.

*Trapezia digitalis*, Latreille, Encycl. Meth. X. 696 : Milne Edwards, Hist. Nat. Crust. I. 429 : Heller, SB. Ak. Wien, XLIII. 1861, p. 352 : Kossmanu, Reise roth. Meer., Crust. p. 42 : de Man, Notes Leyden Mus. II. 1880, p. 177 : Ortmann, Zool. Jahrb. Syst. X. 1897, pp. 203, 208.

*Trapezia leucodactyla*, Rüppell, 24 Krabben roth. Meer. p. 28.

? *Trapezia fusca*, Lucas in Jacquinot's Voy. Astrolabe, Zool. III. Crust. p. 45, pl. iv. fig. 17.

Carapace about five-sixths as long as broad, but having a broader look, owing to the less marked projection of the front and the greater

curvature and convergence of the postero-lateral borders; its surface smooth and burnished.

The front is slightly notched in the middle line, and is separated from the hardly-dentiform supra-orbital angles by a shallow notch: it is thus rather obscurely divided into two lobes, each of which has the free edge finely denticulate. Outer angle of orbit acute, as is also the inner angle of the lower margin.

There may be a slight notch at the junction of the antero-lateral and postero-lateral borders, but there is never a spine.

Chelipeds subequal in both sexes, about twice the length of the carapace, smooth and burnished. The arm is much shorter than it is in *T. cymodoce* and *ferruginea*, being broader than long, its foliaceous anterior border dentate or crenate; inner angle of wrist acute; upper border of hand rounded, lower border sharp.

Legs smooth, dactylus with a few bristles, which are almost absent from the other joints.

Colours in spirit, blackish-brown, fingers, lower edge of hand and distal ends of leg joints lighter.

In the Indian Museum are six specimens from Ceylon and Palk Straits.

#### TETRALIA, Dana.

*Tetralia*, Dana, Silliman's Journ. Sci. and Arts (2) XII. 1851, p. 128, and Proc. Ac. Nat. Sci. Phila., 1852, p. 83, and U. S. Expl. Exp. Crust. pt. I. p. 261.

*Tetralia*, Heller, SB. Ak. Wien, XLIII. 1861, p. 353.

*Tetralia*, A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 261.

Closely resembles *Trapezia* in form, and only differs in the following characters:—

The front is hardly separated from the hardly-dentiform supra-orbital angle by a small and very inconspicuous notch, and has its free edge very slightly convex, very faintly sinuous or straight (instead of being divided into lobes or teeth), and finely denticulate.

The antero-lateral borders are usually continued into the postero-lateral without any trace of a spine or notch to mark their junction.

The eyes are smaller.

The chelipeds are usually remarkably unequal; the arms are shorter and their expanded anterior edge is not denticulate throughout.

The meropodites of the legs are short and broad, almost foliaceous.

The abdomen of the male consists of seven separate segments.

#### 147. *Tetralia glaberrima* (Herbst.)

*Cancer glaberrimus*, Herbst, Krabben I. ii. 262 pl. xx. fig. 115.

*Trapezia integra*, Latreille, Encycl. Meth. x. p. 696.

*Trapezia glaberrima*, Krauss, Sudafr. Crust. p. 35.

*Tetralia glaberrima*, Dana, U. S. Expl. Exp. Crust. pt. i. p. 263, pl. xvi. fig. 3: Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 38: A Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 262: Kossmann, Reise roth. Meer. Crust. p. 46: Lenz and Richters, Abh. senck. Ges. XII. 1881, p. 422; de Man, Archiv. für Naturges. LIII. 1887, i. p. 321: J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 366: Ortmann. Zool. Jahrb., Syst., VII. 1893-94, p. 485, and X. 1897, p. 209, and in Senon's Forschungsr. (Jena. Denk. VIII.) Crust. p. 53: Zehntner, Rev. Suisse Zool. II. 1894, p. 157.

*Tetralia nigrifrons*, Dana, Proc. Ac. Nat. Sci. Philad. 1852, p. 83, and U. S. Expl. Exp. Crust. pt. i. p. 262, pl. xvi. figs. 2a-d: A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 262: Hilgendorf, MB. Ak. Berl. 1878, p. 798

*Trapezia serratifrons*, Lucas in Jacquinot's Voy. Astrolabe, Zool., III. Crust. p. 47, pl. iv. fig. 20.

*Tetralia lævissima*, Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 38.

*Tetralia carimana*, Heller, Abh. zool.-bot. Ges. Wien. XI. 1861, p. 14, and SB. Ak. Wien. XLIII. 1861, p. 353, pl. iii. figs. 24, 25, and Novara Crust. p. 26: Miers, Phil. Trans. 168, 1879, p. 488, and Zool. H. M. S. Alert, pp. 518, 537: de Man. Notes Leyden Mus., II. 1880, p. 180: R. I. Pocock, Ann. Mag. Nat. Hist. (6) V. 1890, p. 73: Whitelegge, Mem. Austral. Mus. III. 1897, p. 138.

*Tetralia heterodactyla*, Heller, Abh. zool.-bot. Ges. Wien. XI. 1861, p. 14, and SB. Ak. Wien. XLIII. 1861, p. 354.

Carapace about five-sixths as long as broad, flat smooth and shiny, with occasionally a faint short and distant pubescence near the frontal and lateral margins.

The front is finely and evenly denticulate, is almost straight, and is generally but not always separated from the similarly denticulate supra-orbital angle by a slight and inconspicuous break. The lateral borders are very slightly curved in their anterior half and are moderately convergent in their posterior half: they show no trace of a spine or notch, at least in the adult.

The chelipeds are very unequal both in length and bulk in both sexes, but even more so in the male than in the female.

In the male the larger cheliped is a good deal more and the smaller a good deal less than twice the length of the carapace: in the female the larger is about  $1\frac{3}{4}$  times and the smaller about  $1\frac{1}{3}$  times the length of the carapace.

The arm has the distal end of its anterior border expanded and finely denticulate: a little down and a few hairs are present on the outer surface of the wrist hand and finger, especially in the larger cheliped.

At the base of the larger hand, on the upper part of the outer surface, is a roundish pit of variable size and depth and usually full of hair.

The legs are rather short and stout and end in a curious little

coarse blunt claw: the meropodites are singularly broad and flat: the dactyli and propodites have both edges, and the carpopodites the upper edge, somewhat hairy.

Colours in spirit rather variable: sometimes uniform yellow or brown, usually the edge of the front and of the anterior part of the lateral margin is darker—almost black; occasionally the ends of some of the leg-joints have a black spot, and sometimes the legs are broadly banded yellow and blackish-brown.

In the Indian Museum are 78 specimens, from the Andamans, Mergui, Ceylon, the Maldives and the Mekran coast.

In some but not in all young specimens there is a small lateral spine placed far forward on either lateral border of the carapace.

#### QUADRELLA, Dana.

*Quadrella*, Dana, Silliman's Amer. Journ. Sci. and Arts (2) XII. 1851, p. 128, and Proc. Ac. Nat. Sci. Philad. 1852, p. 84, and U. S. Expl. Exp. Crust. pt. i. p. 265.

*Quadrella*, A. Milne Edwards, Miss. Sci. Mex. Crust. p. 344.

Carapace squarely hexagonal, nearly as long as broad, moderately convex, perfectly smooth without trace of regions.

The antero-lateral borders, which are about equal in length to the postero-lateral, are straight, slope very slightly outwards, and join the postero-lateral at a very wide, but distinct, angle, marked usually by a spine.

The fronto-orbital border is about equal in extent to the greatest breadth of the carapace, and the broad almost horizontal front is cut into four acute spines, external to which, on either side, is seen the acute spiniform internal angle of the lower edge of the orbit projecting beyond the acute supra-orbital angles; so that the front is commonly spoken of as six-spinate.

The orbits, which are small and are cut out of the antero-lateral angles of the carapace, afford no concealment to the eyes: their upper and lower inner angles are in contact so as to exclude the antennæ.

The antennules fold almost transversely. The basal antennal joint is slender and does not nearly reach the front; the flagellum is slender and long—nearly half the length of the carapace.

The crests of the endostome are distinct and the expiratory canals are closed in as in *Trapezia*, etc.

The chelipeds are massive but are of great length, the whole of the long arm projecting beyond the edge of the carapace: they are subequal, or not markedly unequal, in both sexes.

Legs long and slender, the dactyli strongly and evenly serrated along the inner edge.

The abdomen of the male consists of 5 segments, the 3rd-5th being fused together.

The species of this genus inhabit stocks of corals and Alcyonarians.

148. *Quadrella coronata*, Dana.

*Quadrella coronata*, Dana, Proc. Acad. Nat. Sci. Philad., 1852, p. 84, and U. S. Expl. Exp. Crust. pt. i. p. 266, pl. xvi. figs. 5a-d: Ortmann, Zool. Jahrb. Syst. X. 1897, p. 210.

*Trapesia* sp. Miers, Zool. H. M. S. Alert, p. 536, footnote, (see Challenger Brachyura, p. 163 footnote).

Carapace squarely hexagonal, moderately convex, perfectly smooth, polished, about as long as broad. An acute procurved spine at the open angle of junction of the antero-lateral and postero-lateral borders.

Front with 6 horizontal spines, the four larger of which belong to the front proper, the other two being at the lower inner angles of the orbits which are much more prominent than the also spiniform upper inner angles.

Outer angle of orbit acute: eyes small, the diameter of the cornea about a tenth the length of the carapace.

Chelipeds smooth and polished, about  $2\frac{1}{4}$  times the length of the carapace, the arm and the palm each being nearly as long as the carapace. The whole arm, as well as the end of the ischium, visible, from above, beyond the carapace; an acicular spine at the inner angle of the ischium and from six to ten such spines along inner (anterior) border of arm; one, or two, little spines sometimes, but not always, present at inner angle of wrist: lower border of hand quite smooth.

Legs long slender, about  $1\frac{1}{4}$  times the length of the carapace: a few silky hairs on dactylus and propodite, and sometimes a very few on the carpus also: the inner edge of the dactylus strongly toothed.

Colours in spirit, milkwhite.

In the Indian Museum are 9 specimens from various parts of the Indian coasts and islands and from depths of 28 to 88 fathoms (one specimen from ? 7 fathoms).

*Quadrella coronata* var. *maculosa*, nov.

Differs from the typical form in the following particulars:—

(1) the greatest breadth of the carapace is distinctly more than the greatest length (including frontal spines):

(2) the chelipeds, under a lens, are frosted over with tiny granules: the anterior border of the arm is finely denticulate, with 2 or 3 spines at the distal end only; the inner border of the hand and thumb is finely denticulate:

(3) the carapace is closely covered with tiny purple (in spirit) dots, except for a very distinctly defined **W**-shaped white area stretching across its posterior half: the legs, sternum and abdominal terga are less closely covered with similar purple specks: chelipeds white.

Length of carapace 7 millim., breadth 8 millim.

In the Indian Museum are a male from off Table I. (Andamans) 15-35 fms., and a female from off the Andamans, 20 fms.

*Quadrella coronata*, var. *reticulata*, nov.

Differs from the typical form in the following particulars:—

(1) the carapace is distinctly broader than long:

(2) the chelipeds in the male are only about  $2\frac{1}{2}$  times the greatest length of the carapace, and under the lens are more or less frosted over with granules: the anterior border of the arm is serrate, the inner border of the hand and thumb is finely denticulate:

(3) the carapace is symmetrically traversed by several fine purple-brown lines which intersect to form a regular and wide meshwork, and there is an irregular meshwork of similar coloured lines on the hands.

Length of carapace 7 millim., breadth 8 millim.

In the Indian Museum are a male from the Andamans, taken on a *Spongodes*, and two from off Ceylon 34 fms.

149. *Quadrella boopsis*, n. sp.

Differs from *Q. coronata* in the following particulars:—

(1) the chelipeds in the male are only about twice the greatest breadth of the carapace:

(2) the arm is stout, is only about three-fifths the greatest length of the carapace, and has its anterior border serrated, not spiniferous:

(3) the eyes are large, their diameter being about one-fifth the greatest length of the carapace:

Colours in spirit uniform yellowish.

Length of carapace equal with the breadth, which is 5 millim.

In the Indian Museum are a male and a female from the Arakan coast 20-30 fms.

This species is not the young of *Q. coronata*, which has the long slender arm and small eyes of the adult.

SPHENOMERUS, Wood-Mason.

*Sphenomerus*, Wood-Mason, Ann. Mag. Nat. Hist. March 1891, p. 263.

Carapace transversely oval or subcircular, the front and antero-lateral margins forming together a semicircle; markedly convex in both directions, perfectly smooth, without trace of regions.

Antero-lateral borders shorter than the postero-lateral—a spinule at their point of junction.

Front somewhat deflexed, broad and broadly bilobed. Orbits affording little or no concealment to the eyes, without fissures or sutures: there is a gap between the front and the inner angle of the orbit in which the antennary flagellum is lodged. The fronto-orbital border, in the adult, is not quite  $\frac{2}{3}$  the greatest breadth of the carapace.

The antennules fold nearly transversely: the basal antennal joint does not reach the front, the flagellum is a good deal longer than the major diameter of the orbit.

The buccal cavern is a little narrowed anteriorly. The crests of the endostome are very faint, but to make up for this the anterior edge of the buccal cavern is puffed out and is very deeply excised on either side of the middle line; the anterior margin of the foliaceous process of the 1st maxillipeds is also excised to correspond, and so a permanent expiratory orifice is formed, which is very large and prominent beyond the almost transverse anterior edge of the merus of the external maxillipeds.

The chelipeds are stout, very long and not very unequal; the whole of the arm projects beyond the edge of the carapace: the fingers are somewhat compressed and are pointed.

The legs are rather slender.

The abdomen of the male consists of five pieces, the 3-5th somites being rigidly united but without obliteration of sutures.

#### 150. *Sphenomerus trapezioides*, Wood-Mason.

*Sphenomerus trapezioides*, Wood-Mason, Ann. Mag. Nat. Hist. March 1891, p. 263: Ill. Zool. Investigator, Crust. pl. v. fig. 2 (where the carapace is drawn a little too broad).

Carapace about  $\frac{2}{3}$  as long as broad, convex in all directions, smooth, polished.

The front is about  $\frac{2}{3}$  the greatest breadth of the carapace, is obliquely deflexed, and is divided into two rather shallow broadly-rounded lobes the free edge of which is entire.

The supra-orbital angle is not defined, but the dentiform or spini-form angle of the lower edge of the orbit can be seen from above.

The antero-lateral margins form with the front a semicircular curve, each carries three sharp spinules, namely, one at the outer angle of the orbit, one at the junction with the postero-lateral border and one exactly intermediate between the other two.

The chelipeds are a little, but not very remarkably, unequal: the larger one is about  $2\frac{1}{2}$  times the length of the carapace. Their surface is smooth and polished. The arm, the whole of which is visible beyond

the carapace, has much the same shape as in *Trapezia*, but its anterior border, though serrated, is not expanded; the lower border of the hand is sharp and somewhat dilated posteriorly, as in *Trapezia*: the inner angle of the wrist is rounded, but sometimes carries a small spinule.

The legs are slender smooth and polished, and have a few hairs distally

Colours in spirit yellowish white, fingers sometimes blackish in their basal half.

Length of carapace of largest specimen 9 millim., breadth 11 millim.

In the Indian Museum are 11 specimens from the Andaman Sea at depths between 130 and 290 fms.

### Alliance III. *Domecioida*.

#### DOMECIA, Eydoux and Souleyet.

*Domecia*, Eydoux and Souleyet, Voy. Bonite, Crust. Zool. vol. i. p. 234: Lucas in Jacquinot's Voy. Astrolabe, Zool. vol. iii. Crust. p. 48.

*Domaecius*, Dana, Silliman's Amer. Journ. Sci. and Arts, (2) XII. 1851, p. 128, and U. S. Expl. Exp. Crust. pt. i. pp. 230, 251.

*Domecia*, A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 263, and Miss. Sci. Mex. Crust. p. 345.

? *Nelus*, Desbonne and Schramm, Crust. Gaudaloupe, p. 35.

Carapace somewhat oval transversely but much contracted posteriorly, flat, somewhat hairy, with no trace of regions.

The fronto-orbital border is not much less than the greatest breadth of the carapace. The front is profusely spinate, the spines being sharp, a little curved, and falling into about six tufts or groups separated by more or less well-marked intervals.

The antero-lateral borders pass backwards with but little outward slope: they are a little shorter than the concave and convergent postero-lateral borders, and are armed with numerous sharp curved spines.

The orbits are at the antero-lateral angles of the carapace and do not conceal the eyes, their edge shows no fissures or sutures: their upper and lower inner angles are broadly in contact, or almost in contact, so as to exclude the antennæ.

The antennules fold nearly transversely. The basal antennal joint hardly reaches the front, though its outer angle is produced towards the front: the flagellum is short—hardly as long as the orbit.

The buccal cavern is broad: the crests of the endostome are not very strong; nor is the foliaceous process of the 1st maxillipeds produced far forwards: the external maxillipeds are very large, and the merus is remarkably broad and short.

The chelipeds are somewhat unequal, and are short and not very massive: the arm is almost entirely hidden by the carapace: fingers compressed, pointed.



The legs are stout, especially the meropodites.

The abdomen of the male has all 7 segments distinct and separate.

151. *Domecia hispida*, Eydoux and Souleyet.

*Domecia hispida*, Eydoux and Souleyet, Voy. Bonite, Zool. vol. i. p. 235, pl. ii. figs. 5-10: Dana, U. S. Expl. Exp. Crust. pt. I. p. 251: Lucas in Jacquinot's Voy. Astrolabe, Zool. vol. iii. Crust. p. 50, pl. iv. fig. 3-7: Stimpson, Bull. Mus. Comp. Zool. II. 1870-71, p. 145: A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 263, and Miss. Sci. Mex. Crust. p. 345, pl. lviii. fig. 2 (not good): de Man, Archiv. für Naturges. LIII. 1887, i. p. 326: Ortmann, Zool. Jahrb., Syst. VII. 1893-94, p. 478.

? *Neleus acanthophorus*, Desbonne and Schramm, Crust. Guadalupe, p. 35.

? *Eupilumnus websteri*, Kingsley, Proc. Ac. Nat. Sci. Philad. 1879, p. 397, pl. xiv. fig. 3.

Carapace covered with light-coloured hairs: antero-lateral border with five or six (including the orbital angle) acute dark-tipped spines, and several similar spines on the carapace just inside the antero-lateral border, and also just inside the spiny fronto-orbital border. The orbital margin and the prominent edge of the epistome are finely denticulate.

Merus of the external maxillipeds extremely broad and short, with an elevated patch of denticles on its outer surface.

Chelipeds a little unequal, the larger one is not very much longer than the carapace: the arm, wrist, hand and dactylus are all studded with acute spines.

Legs stout, not very much shorter than the chelipeds: the anterior surface of the last four joints fringed with hairs, and the anterior edge of the merus spinate, as also, but much less distinctly, is the anterior edge of the carpus and propus.

Colours in spirit, yellow with brown blotches on the carapace and chelipeds and indistinct dusky cross-bands on the legs.

In the Indian Museum are a male and female from off Little Andaman I., 10 fms., and two females from Great Coco I.

Alliance IV. *Melioida*.

MELIA, Latreille, Edw.

*Melia*, Latreille, Encycl. Meth. X. 705.

*Melia*, Milne Edwards, Hist. Nat. Crust. I. 431.

*Melia*, Dana, Silliman's Journal (2) XII. 1851, p. 128, and U. S. Expl. Exp. Crust. pt. I. p. 242.

Carapace rather depressed and narrow, hexagonal, not concealing the first  $2\frac{1}{2}$  or 3 abdominal terga even in the male, the regions not, or fairly distinctly, delimited.

Fronto-orbital border more than  $\frac{3}{4}$  the greatest breadth of the carapace. Orbits very shallow, affording little concealment to the eyes. Antennules folding obliquely.

Basal antennal joint slender, of good length but yet hardly touching the front; the flagellum very long (half the length of the carapace, or more), lodged in the orbital hiatus.

*Chelipeds slenderer and much shorter than the walking-legs*, the hand often hidden in a matted tuft of hair.

Walking-legs long and stout, *the third pair the longest of all*.

External maxillipeds somewhat slender and almost subpediform.

Both the Indian species of this genus differ from *Melia tessellata* (of which there are several specimens in the Indian Museum collection) in having the carapace rugulose, the antero-lateral border crenulate, the front more prominent, and the regions fairly well delimited and areolated.

#### 152. *Melia cæstifer*, n. sp.

Carapace hexagonal, about as long as broad, rugulose or tuberculous, somewhat pubescent posteriorly and laterally, the regions fairly well defined and areolated.

Front broad, sublaminar, square-cut, horizontal but on a lower plane than the gastric region.

Antero-lateral border cut into three blunt lobes, the first of which is confluent with the outer orbital angle.

Antennary flagellum very long.

Chelipeds extremely slender; hand hidden in a tuft of adherent hair, which has to be removed before the slender hooked fingers can be seen.

First pair of legs somewhat more slender than the others, and shorter than the last pair; the second and third pair stouter and longer than the others, the third pair being the longest and the stoutest (especially as to the merus) of all. All the legs are more or less pubescent.

The abdomen of the male consists of 5 segments, the 3rd-5th being fused.

Colours in spirit, white, the bases of all the rugosities or tubercles defined by more or less circular very fine dark lines.

Length of carapace barely 4 millim., breadth hardly over 4 millim.

In the Indian Museum are a male and a female from off Ceylon, 34 fms.

#### 153. *Melia pugil*, n. sp.

Differs from *M. cæstifer* (females compared) in the following characters :—

(1) the carapace is distinctly broader than long :

(2) the regions though as well defined are not nearly so much broken up into tubercles :

(3) just behind the 3rd tooth of the antero-lateral margin is a distinct indentation, making the anterior end of the postero-lateral border dentiform :

(4) the chelipeds are distinctly stouter and the hand is concealed in a fleshy glove :

(5) the first pair of legs is as stout as the fourth.

Length of carapace 5 millim., breadth 7 millim.

Colours in spirit, white, with a wider and more angular network of fine dark lines.

In the Indian Museum is a single female from off Ceylon, 26½ fms.

### Appendix to Hyperolissa ?

#### PLATYPILUMNUS, Wood-Mason.

*Platypilumnus*, Wood-Mason MS., Alcock, Ann. Mag. Nat. Hist. May 1894, p 401.

Carapace hexagonal—the prominent bilaminar horizontally-projecting front forming the shortest side of the hexagon—thin, depressed, perfectly flat, with the regions and subregions very faintly impressed : the antero-lateral borders are spinate, the postero-lateral are slightly convergent, and the posterior border is long.

Front about a third the greatest breadth of the carapace. Upper margin of orbit spinate, the inner angle of the lower margin acutely spiniform.

The antennules fold transversely. The basal antennal joint, though of fair length, does not reach the front ; the next joint lies loosely in the wide orbital hiatus ; the antennary flagellum is long, about twice the major diameter of the orbit.

Buccal cavern quadrangular, very well defined anteriorly ; the external maxillipeds do not nearly cover it, but leave the efferent branchial channels permanently widely open ; the endostomial ridges that define these last are well defined posteriorly, but do not reach the anterior border of the buccal cavern.

Chelipeds in the female, markedly unequal, fingers long, pointed.

Legs long, slender, compressed, spiny.

As there is only a single female in the Indian Museum, I cannot be sure of the place of this genus in the system. It *probably* belongs to the *Cancroidea*, and should be placed near *Galene*.

*Platypilumnus gracilipes*, Wood-Mason.

*Platypilumnus gracilipes*, Wood-Mason MS., Alcock, Ann. Mag. Nat. Hist. May, 1894, p. 401: Ill. Zool. Investigator, Crust. pl. xiv. fig. 6.

Carapace much depressed, perfectly flat above, with the surface nearly smooth centrally and very finely and closely granular laterally, and with the regions indistinctly defined. The front has the form of a horizontally projecting bilobed lamella, with the free edge sharply and very evenly spinate and the sides turned abruptly downwards. The margins of the orbit are spinulate, the upper margin the more distinctly so, and the lower margin terminates internally in a strong oblique spine, the point of which inclines towards the sharply vertical tooth formed by the already mentioned downfolding of the lateral edge of the frontal lamella.

The antero-lateral borders of the carapace which are arcuate and are shorter than the postero-lateral, are armed with three large spines, in front of, between, and behind which are several spinules.

The pterygostomian regions are large and inflated, and the branchial apertures, especially the efferent aperture, are large and patulous.

The eye-stalks are large and are of moderate length; the corneal region is rather small.

The antennules are long and are transversely folded, their basal joint is large and inflated.

The antennæ are long, their basal joint is slender and free; the second joint lies loosely in the internal orbital hiatus.

The inner edge of the meropodite of the external maxillipeds is convex, with a pair of little spines at the summit of the convexity; the succeeding joint arises at the antero-internal angle.

The thoracic legs are furnished with many spines and long hairs. The chelipeds, which are robust, are unequal; their prismatic arm has all its borders spiny; the short inflated wrist is sharply granular and spinulate in the distal half of its dorsal surface and along the outer edge, while the inner edge bears a pair of rather large spines; the hand is spinulate everywhere in the smaller cheliped, but only in the proximal third of its outer surface in the larger; the fingers also of the smaller cheliped are spinulate on the outer surface, while those of the larger cheliped are smooth; the cutting-edges of the fingers are finely and unevenly toothed.

The other thoracic legs are long, compressed, and slender, and have the meropodite spiny along both edges, the carpopodite and propodite spiny along the front edge, and the dactylopodite styloform.

Colour in the fresh state yellowish red.

Andaman Sea, 188-220 fms. A single female.



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*Materials for a Carcinological Fauna of India. No. 4. The Brachyura Cyclometopa. Part II. A Revision of the Cyclometopa with an Account of the Families Portunidæ, Cancridæ and Corystidæ. By A. ALCOCK, M.B., C.M.Z.S., Superintendent of the Indian Museum.*

[Received 16th March. Read 5th April, 1899.]

In correction of my previously expressed opinion (*Journal* 1898, Vol. LXVII, pt. II, pp. 68 and 69) I now have no hesitation in accepting the limits of the Cyclometopa that have been fixed by Miers in *Challenger Brachyura*, pp. 106-215. I am not, however, in agreement with Miers subdivision of this great group.

It seems to me that Ortmann (*Zool. Jahrb., Syst., &c.*, VII, 1893-94 and IX, 1895-97) has struck out a much more natural classification of the Cyclometopa; but as he includes the *Parthenopidæ* and excludes the *Corystidæ*, I am unable to adopt it in its entirety. There can be little doubt, however, that Ortmann's conceptions of *Xanthini* and *Cancrini* agree with nature.

The present paper contains (1) a statement of my own views as to the classification of the Cyclometopa, and (2) diagnoses of the Indian genera and species of three of the constituent families, namely, the *Portunidæ*, the *Cancridæ* and the *Corystidæ*.

The Indian species of *Portunidæ*, as far as I know, number 67 or 68, of which 65 are represented in the Indian Museum: of *Cancridæ* 4, all of which are in the Indian Museum: of *Corystidæ* only one—a new species of *Nautilocorystes* dredged by the R. I. M. S. "Investigator."

### Tribe CYCLOMETOPA, or CANCROIDEA.

*Cyclometopes*, *Telphusiens* and *Corystiens*, Milne Edwards, Hist. Nat. Crust. I, 264 and 363, II. 7 and II. 139.

*Cancroidea* and *Corystoidea*, Dana, U. S. Expl. Exped., Crust. pt. I, pp. 142 and 296.

*Cyclometopes* and *Corystiens*. A. Milne Edwards, Ann. Sci. Nat. Zool. (4) XIV, 1860, p. 185.

*Cyclometopa* or *Cancroidea*, Miers, Challenger Brachynra, pp. 106–215.

*Maiodea-corystoidea*, pp. 26 and 28; *Cancroidea-portuninea*, pp. 27 and 65; and *Cancroidea-cyclometopa* (*Cancrini* and *Xanthini* only), pp. 412, 421, 428: Ortmann, Zool. Jahrb., Syst., etc., VII, 1893-94.

*Oxyrhyncha-corystidæ* and *Cyclometopa* or *Cancroidea* Ortmann, in Bronn's Thier-Reich V. ii. Arthropoda, pp. 1166 and 1165.

Carapace variable, either broader than long (almost all *Telphusidæ* *Xanthidæ* and *Portunidæ*, and some *Cancridæ*) or longer than broad (*Corystidæ* and most *Cancridæ*), the antero-lateral borders generally arched, sometimes very strongly so, the postero-lateral borders generally convergent, sometimes very strongly so. Front broadish or broad, horizontal or obliquely deflexed, occasionally prominent (but never forming a pointed rostrum with the basal antenna-joints for pillars as in the *Oxyrhyncha*).

Buccal orifice square-cut—only in the *Corystidæ* may its anterior angles be rounded off and a little convergent and its anterior boundary be indefinite: palp of external maxillipeds almost always articulating with the antero-internal angle of the merus.

Epistome transverse, never long fore and aft, sometimes linear and sunken (not distinguishable in the *Corystidæ*).

Antennules folding either nearly transversely or longitudinally.

Branchiæ nine on either side, their efferent channels opening on either side of the palate.

The abdomen of the male occupies all the space between the last pair of legs.

The genital ducts of the male open on the bases of the last pair of legs.

The *Cyclometopa* may be divided into the following 5 families:—

Family I. TELPHUSIDÆ. Carapace usually transverse, broader than long, subquadrilateral or oblate-oval, the antero-lateral borders short, the regions not well delimited (although the cervical suture may be deep and conspicuous) and never areolated. Front broad, not separated from the inner supra-orbital angles, obliquely deflexed (occasionally horizontal); commonly entire (occasionally lobed).

The antennules fold transversely in narrow fossæ.

The antennal flagella short.

Epistome of fair length fore and aft, well demarcated and never encroached upon by the external maxillipeds.

Buccal orifice quadrate, a little elongate and a little bit rounded and contracted at the anterior angles.

Legs gressorial.

Sternum broad.

The Telphusidæ are the highest Cyclometopes, and approach the *Catometopa*. They appear to me, from consideration both of structure and of habitat, to have branched off from the Oziine or Eriphiine stocks, but are now inhabitants of fresh-water or damp jungle.

I do not propose to treat this family further, in this series of papers, until I have finished the other Brachyura.

Family II. XANTHIDÆ. Carapace transversely oval, or transversely hexagonal, or subquadrilateral, or (rarely) subcircular, but almost always broader than long; the regions very often, but by no means always, well defined and multi-arcolate. Front broadish or very broad, oftener than not it is *not* sharply separated from the supra-orbital angles, often obliquely deflexed, usually showing a division into two lobes (each of which may, in some cases, show a further subdivision into two lobules).

The antennules fold either quite transversely or obliquely transversely.

Antennal flagella short or slender.

Epistome of fair length fore and aft, well demarcated, not encroached on by the external maxillipeds.

Buccal orifice quadrate, commonly broader than long.

Legs gressorial.

Sternum moderately broad—much narrower than in the *Telphusidæ*.

I have already in this *Journal*, Vol. LXVII, part 2, 1898, pp. 69-233, dealt with the family *Xanthidæ* in detail.

The family is there divided into the following 7 sub-families:—

Sub-family	I.	<i>Xanthinæ</i> , loc. cit.	p. 77.
"	II.	<i>Actaeinæ</i> "	p. 137.
"	III.	<i>Chlorodinæ</i> "	p. 156.
"	IV.	<i>Menippinæ</i> "	p. 177.
"	V.	<i>Oziinæ</i> "	p. 181.
"	VI.	<i>Pilumninæ</i> "	p. 190.
"	VII.	<i>Eriphiinæ</i> "	p. 213.



In the *Oziinæ* and *Eriphiinæ* this family approaches the *Telphusidæ*: by the *Pilumninæ* and *Xanthinæ* it is linked with the section *Carcininæ* of the *Portunidæ* and, through these, with the *Cancridæ*.

Family III. PORTUNIDÆ. Carapace transversely hexagonal, sometimes subquadrate, occasionally elongate-obovate or even subcircular, but generally broader (typically much broader) than long, the regions often not well defined and seldom areolated. Front remarkably broad, generally well separated from the supra-orbital angles and almost always cut into teeth or lobes which are from two to six in number exclusive of the supra-orbital angles.

The antennules fold transversely or obliquely transversely.

The antennal flagella are almost always long and slender.

The epistome may be of fair length fore and aft, or may be linear: it may be, but is not usually, encroached upon by the external maxillipeds.

Buccal orifice quadrate, well defined anteriorly, usually, but by no means always, broader than long.

The last pair of legs are (with a few exceptions in which their dactylus is hook-like or is merely lanceolate) peculiarly modified for swimming, having at least the last two joints compressed, broadly-foliaceous, and paddle-like.

Sternum broad.

This family is here divided into 4 sub-families, namely:—

Sub-family I. *Carcininæ* see ahead pp. 6, 7.

„ II. *Portuninæ* „ pp. 6, 7.

„ III. *Caphyrinæ* „ pp. 6, 8.

„ IV. *Lupinæ* „ pp. 6, 8.

The *Carcininæ*, by way of *Carcinus*, approach the *Xanthidæ*, by way of *Hoploxanthus*.

Family IV. CANCRIDÆ. Carapace either transversely oval (*Cancrinæ*) or, more commonly, elongate-oval or subcircular, the regions rarely strongly delimited and areolate. Front not very broad, very often cut into 3 (sometimes 2 or 4) sharp teeth, sometimes rather prominent.

The antennules fold longitudinally.

Antennal flagella usually long, coarse, and setaceous.

Epistome usually of fair length, often sunken, always overlapped, more or less, by the external maxillipeds, which are commonly, though not always, elongate. Buccal orifice quadrate, commonly a little elongate.

Legs gressorial.

Sternum narrow.

The family is here divided into 6 sub-families :—

Sub-family	I. <i>Cancrinæ</i>	see ahead	p. 95.
„	II. <i>Pirimelinæ</i>	„	p. 95.
„	III. <i>Thiinæ</i>	„	p. 96.
„	IV. <i>Atelecyclinæ</i>	„	p. 96.
„	V. <i>Acanthocyclinæ</i>	„	p. 96.
[? Subfamily VI.	<i>Trichiinæ</i>	„	p. 96.]

In the *Pirimelinæ* and *Thiinæ* this family approaches the *Carcininæ* among the *Portunidæ*; and by the *Atelecyclinæ* it is allied to the *Corystidæ*.

Family V. CORYSTIDÆ. Carapace a good deal longer than broad, elongate-oval, the regions fairly well defined or not, not areolated. Front rather prominent, not very broad, cut into 2 or 3 teeth.

The antennules are small and fold longitudinally.

The antennal flagella, when present, are long—sometimes longer than the carapace—coarse, and setaceous.

There is no epistome, and the maxillipeds, which occasionally have a pediform cast, are elongate and extend almost up to the antennules.

Buccal cavern rather elongate, its sides slightly convergent quite at their anterior end.

Legs either gressorial, or the last pair modified for swimming.

Sternum narrow and elongate.

In some of the genera of this group the antennal flagella are as long as the carapace and the dactyli of the legs are almost styliform: in others the dactyli are lanceolate—the last pair broadly so—and the antennal flagella are not more than half as long as the carapace.

The *Corystidæ* are the lowest *Cyclometopa* and have much the same relative position to the higher families of *Cyclometopes* as the *Raninidæ* have to the higher families of *Oxystomes*.

### Family PORTUNIDÆ.

*Portuniens*, Milne Edwards, Hist. Nat. Crust. I. 432: A. Milne Edwards, Ann. Sci. Nat., Zool., (4) XIV. 1860, p. 195; and Archiv. du Mus. X. 1861, p. 310.

*Portunidæ* and *Platyonychidæ*, Dana, U. S. Expl. Exp. Crust. pt. I. pp. 267, 290.

*Portunidæ*, Miers, Challenger Brachyura, p. 169.

*Portuninea*, Ortmann, Zool. Jahrb., Syst., VII. 1893, p. 65.

Carapace depressed, or little convex (strongly convex in *Sphærocarcinus*), hexagonal, sometimes subquadrate, occasionally elongate-obovate or even subcircular, but generally broader (typically much broader) than long; the regions most often not well defined, seldom arcolated;

the antero-lateral borders cut into teeth which are from 5 (very rarely 4) to 9 in number (in *Podophthalmus* and some species of *Euphyllax*, in which the antero-lateral borders are excavated for the enormously prolonged orbits, the number of teeth is reduced further).

Front remarkably broad, generally well separated from the supra-orbital angles, almost always cut into teeth or lobes, which are from 2 to 6 in number exclusive of the supra-orbital angles.

The antennules fold transversely or obliquely transversely.

Antennal flagella almost always long and slender.

The epistome may be of fair length fore and aft, or may be linear and sunken, but the palate is well defined anteriorly.

Buccal cavern quadrate, commonly broader than long, the merus of the external maxillipeds never decidedly elongate.

The last pair of legs are, with few exceptions, modified for swimming, having at least the last two joints compressed, greatly broadened and paddle-like. (In *Caphyra* and *Sphærocarcinus* the last pair of legs are much like the other three pairs, are subdorsal, and end in a hook-like dactylus. In *Carcinus*, *Nectocarcinus* and *Portumnus* the dactylus of the last pair of legs is merely lanceolate).

I would propose to divide the Portunidae into four sub-families:—

1. Sub-family *Lupinæ*. The chelipeds are longer, usually much longer, than any of the legs, the first three pair of which have a tendency to be slender and the last pair of which end in typical swimming-paddles: the antero-lateral borders of the carapace are cut into from 5 (very rarely 4) to 9 distinct teeth. The carapace may be subrotund, but it is usually conspicuously broad.

2. Sub-family *Caphyrinæ*. The chelipeds and legs are short, but the chelipeds are distinctly, if only slightly, longer than the legs. The carapace is either as long as broad or very little broader than long, and is either smooth or is traversed on either side by a single ridge running inwards from the last of the (4 or) 5 teeth or puckers into which the antero-lateral border is divided. The last pair of legs are either swimming-paddles or are subdorsal and end in a prehensile dactylus.

3. Sub-family *Portuninæ*. The legs often have a tendency to be stout, and at least one pair of them is at least as long as the chelipeds: the last pair are typical swimming-paddles. The carapace is seldom very broad and its antero-lateral borders are cut into 5 teeth. The basal antenna-joint may be either fixed or movable: it is seldom broader than long, often longer than broad, and lies almost in the longitudinal axis of the carapace.

4. Sub-family *Carcininæ*. The legs have a tendency to be stout, and at least one pair of them is at least as long as the chelipeds: the

last pair end in a lanceolate dactylus and otherwise do not differ much from the other three pairs. Carapace not at all broad, its antero-lateral borders cut into 4 or 5 teeth. The basal antenna-joint is fixed: it is longer than broad and lies in the longitudinal axis of the carapace.

#### Sub-family I. CARCININÆ.

This sub-family comes nearest to the other Cancroid families. Of its constituent genera *Carcinus* touches the Cancridæ and Xanthidæ, *Nectocarcinus* touches the Xanthidæ, and *Portumnus* touches the Corys-tidæ.

It may be divided into two Alliances:—

Alliance 1. *Portumnoida*. Carapace as long as broad: antennæ setaceous: crests of endostome? For the single genus.

*Portumnus*, Leach, Malac. Pod. Brit. text of pl. iv. (= *Xaiva*, Macleay in Smith's Ill. Annulosa S. Africa, p. 62).

Alliance 2. *Carcinoida*. Carapace broader than long: antennæ not setaceous, the basal antenna-joint fixed: the palatal crests defining the efferent branchial channels are either interrupted or completely wanting. Constituent genera:—

1. \**Carcinus*, Leach.

2. \**Nectocarcinus*. A. Milne Edwards, Ann. Sci. Nat. Zool. (4) XIV. 1860, pp. 220, 228; and Archiv. du Mus. X. 1861, p. 404.

#### Sub-family II. PORTUNINÆ.

The material at my disposal is not sufficient to enable me with any confidence to separate the genera of this sub-family into groups, so that the following classification is meant to be merely a suggestion.

Alliance 1. *Portunoida*: The last pair of legs are typical swimming-paddles: the basal antenna-joint may be either fixed or movable: the palatal crests defining the efferent branchial channels may either be distinct and complete or be wanting. Constituent genera:—

1. *Bathynectes*, Stimpson, Bull. Mus. Comp. Zool. II. 1870-71, p. 145 (= *Thranites*, Bovallius, Ofversigt Kongl. Vetensk.-Ak. Forhandl. 1876, No. 9, p. 61).

2. \**Benthochascon*, Alcock.

3. \**Liocarcinus*, Stimpson, Bull. Mus. Comp. Zool. II. 1870-71, p. 146 (footnote).

4. \**Ovalipes*, M. J. Rathbun, Proc. U. S. Nat. Mus. XXI. 1898, p. 597 (for *Platyonychus* as restricted by Miers, Challenger Brachyura, p. 201; = *Anisopus* DeHaan Faun. Japon. Crust. p. 12).

5. \**Parathranites*, Miers, Alcock.

6. *Polybius*, Leach, Malac. Pod. Brit. text of pl. ix. B: and Milne Edwards, Hist. Nat. Crust. I. 438.

7. \**Portunus*, Fabr.: Milne Edwards, Hist. Nat. Crust. I. 439.

Alliance 2. *Cænopthalmoida*. As *Portunoida*, but the inner infra-orbital angle is fused with the inner supra-orbital angle. For the single genus.

*Cænopthalmus*, A. Milne Edwards, Miss. Sci. Mex. Crust. p. 237.

### Sub-family III. CAPHYRINÆ.

The genus *Lissocarcinus* connects this sub-family, by means of *Thalamonyx*, with the Lupinæ. *Caphyra* is another link with the Lupinæ, and *Sphærocarcinus* connects *Lissocarcinus* and *Caphyra*.

The three constituent genera are as follows, and, in my opinion, each genus is equivalent to an "alliance" in the other sub-families:—

1. \**Lissocarcinus*, Adams and White. The basal antenna-joint has its antero-external angle produced to touch the front and occlude the orbital hiatus—much as in *Charybdis* (= *Goniosoma*): the last pair of legs are swimming paddles.

2. *Sphærocarcinus*, Zehntner, Rev. Suisse Zool., Ann. Mus. d' Hist. Nat. Genève, II. 1894, p. 163. As *Lissocarcinus*, but the last pair of legs are as in *Caphyra*, and the carapace is *very strongly convex*.

3. \**Caphyra*, Guérin, Ann. Sci. Nat. XXV. 1832, pp. 285, 286 (= *Camptonyx*, Heller SB. Ak. Wien, XLIII. 1861, i. p. 357). The last pair of legs are subdorsal in position, are almost similar to the other legs and end in a hook-like dactylus. The basal antenna-joint is as in *Charybdis* (= *Goniosoma*).

### Sub-family IV. LUPINÆ.

The genera of this sub-family fall into the 3 following alliances:—

Alliance 1. *Lupoida*. The basal antenna-joint is short and squat and decidedly broader than long; or it has its greatest diameter transverse, or obliquely transverse, owing to the extension of its antero-external angle towards or into the orbit or up to the front.

The chelipeds are usually very much longer than the legs, of which the first 3 pairs have a tendency to be slender and the fourth pair usually has the last four joints much broadened.

The carapace is usually decidedly transverse with the antero-lateral borders longer than the postero-lateral, and is very often crossed by a few long definitely-placed transverse ridges, of which one that arches inwards from the last tooth or spine of the antero-lateral border on either side is the most constant.

The genera that constitute this Alliance are the following:—

1. \**Charybdis*, De Haan (or *Goniosoma*, A. Milne Edwards) with subgenera \**Gonioneptunus* Ortmann and \**Gonihellenus* (nov.).
2. *Cronius*, Stimpson, Ann. Lyc. Nat. Hist. New York, VII. 1860, p. 225 (*Charybdeila*, M. J. Rathbun, Proc. Biol. Soc. Washington, XI. 1897, p. 166).
3. *Lupa*, De Haan, Faun. Japon. Crust. p. 11: A. Milne Edwards, Archiv. du Mus. X. 1861, p. 351 (*Lupella*, M. J. Rathbun, *tom. cit.* p. 155).
4. \**Neptunus*, De Haan (*Portunus*, M. J. Rathbun, *tom. cit.* p. 155, *nec auctorum*) with sub-genera \**Achelous*, \**Amphitrite*, \**Callinectes*, \**Hellenus* (including \**Xiphonectes*) and \**Lupocycloporus* (nov.).
5. \**Scylla*, De Haan.
6. \**Thalamita*, Latreille: with sub-genus *Thalamitoides* A. Milne Edwards, Nouv. Archiv. du Mus. V. 1869, p. 146.
7. \**Thalamonyx*, A. Milne Edwards.
- [8. *Hedrophthalmus*, Nauck, Zeits. Wiss. Zool. XXXIV. 1880, p. 67].

Alliance 2. *Podophthalmoida*. As *Lupoida*, but the eyes are borne on basal stalks of enormous length and the orbits are continued along the whole of the antero-lateral borders of the carapace.

The genera that constitute this Alliance are:—

1. \**Podophthalmus*, Lamarck.
2. *Euphyllax*, Stimpson, Ann. Lyc. Nat. Hist. New York, VII. 1862, p. 225.

Alliance 3. *Lupocycloida*. The basal antenna-joint, though not long, is rather slender and does not lie transversely or have its antero-external angle produced to any extent.

The chelipeds are considerably, sometimes very much, longer than any of the legs, of which the first three pairs are slender.

In the fourth pair of legs the last two joints are much broadened, but the merus and carpus *may be* slender.

The carapace is of no very remarkable breadth, the antero-lateral borders are about as long as the postero-lateral, and at least one transverse ridge is present on either side.

Two genera enter into this Alliance, namely,

1. \**Carupa*, Dana (in which the merus and carpus of the last pair of legs are not broadened).
2. \**Lupocyclus*, Adams and White (in which the merus and carpus of the last pair of legs may either be broadened or not).

In the preceding scheme of classification the Indian genera are printed in Roman type and the genera known to me by autopsy are marked with an asterisk.

*Key to the Indian genera of the Sub-families Carcininæ and Portuninæ.*

- A. Propodite of the last pair of legs merely dilated, the dactylus lanceolate..... CARCINUS.  
 B. Propodite of the last pair of legs typically foliaceous and paddle-like :—  
 1. Carapace smooth; orbits with two very indistinct grooves in the upper margin: arm short, without spines: legs stout..... BENTHO HASCON,  
 2. Carapace with definitely-disposed tubercles; orbits with two open fissures in the upper wall: arm longish, with a spine or spines: legs slender..... PARATHANITES.

*Key to the Indian representatives of the Sub-family Caphyrinæ.*

Chelipeds and legs short: carapace as long as broad or not much broader than long, smooth or with a single transverse ridge on either side: eyes and orbits normal: fronto-orbital border very much less than the greatest width of the carapace: antero-external angle of basal antenna-joint produced to meet the front and fill the orbital hiatus to the exclusion of the flagellum: front cut into two broad lobes besides the inner supra-orbital angles, or subentire..... LISSOCARCINUS.

*Key to the Indian Genera of the Sub-family Lupinæ.*

- I. The eyes, eyestalks, and orbits are normal in size and position :—  
 A. The extent of the fronto-orbital border is decidedly less, and is commonly very much less than the greatest breadth of the carapace, so that the antero-lateral borders are oblique and more or less arched. The antennal flagellum is near the orbital hiatus and sometimes in it :—  
 1. The antero-external angle of the basal antenna-joint not appreciably produced, the flagellum standing in the orbital hiatus :—  
   i. Carapace very decidedly broader than long, its antero-lateral borders cut into seven rather irregular teeth..... CARUPA.  
   ii. Carapace little broader than long, its antero-lateral borders cut into nine teeth which are alternately large and small (the small teeth sometimes obsolescent) .. LUPOCYCLUS.

2. The prolongation of the antero-external angle of the basal antenna-joint is small and lies in the orbit, the flagellum standing in the orbital hiatus: antero-lateral borders of carapace cut into nine large teeth:—
- i. Hand inflated and almost smooth: surface of carapace almost always in some way broken.....
  - ii. Hand prismatic and costate: surface of carapace almost always in some way broken.....
3. The prolongation of the antero-external angle of the basal antenna-joint is large and fills up either all or the greater part of the orbital hiatus:—
- i. The prolongation of the basal antenna-joint does not reach the front, so that the flagellum stands in the upper part of the orbital hiatus: other characters as in *Charybdis*.....
  - ii. The prolongation of the basal antenna-joint fills up all the orbital hiatus to the complete exclusion of the flagellum:—
    - a. Front cut into six lobes or teeth besides the inner supra-orbital angles: antero-lateral borders cut into six teeth.....
    - b. Front cut into two broad lobes besides the inner supra-orbital angles: antero-lateral borders cut into five teeth.....
- B. The extent of the fronto-orbital border is nearly equal to the greatest breadth of the carapace, so that the antero-lateral borders of the carapace are nearly at right angles with the front: the prolongation of the basal antenna-joint that meets the front and occludes the orbital hiatus is so long that the flagellum is far distant from the orbit. The antero-lateral borders are cut into five teeth of which the fourth is often small, or rudimentary, or sometimes obsolete....
- II. The eyes are borne on basal stalks of enormous length, and the orbits extend along the entire length of the antero-lateral borders of the carapace.....

SCYLLA.

NEPTUNUS.

GONIONEPTUNUS.

CHARYBDIS  
(= GONIOSOMA).

THALAMONYX.

THALAMITA.

PODOPHTHALMUS.



## Subfamily I. CARCININÆ.

## CARCINUS, Leach.

*Carcinus*, Leach, Malac. Podophth. Brit. Text of pl. V.: Desmarest, Consid. Gen. Crust. p. 90: Milne Edwards, Hist. Nat. Crust. I. 433: De Haan, Faun. Japon. Crust. p. 13: Bell, British Stalk-eyed Crust. p. 75: A. Milne Edwards, Ann. Sci. Nat., Zool., (4) XIV. 1860, pp. 228, 266; and Archiv. du Mus. X. 1861, p. 390.

*Carcinides*, M. J. Rathbun, Proc. Biol. Soc. Washington XI. 1897, p. 164 (*new name proposed*).

Carapace approaching the hexagonal, not broad, slightly but distinctly convex, the regions fairly well-defined (well-defined for a Portunoid), no distinct transverse ridges.

Front proper fairly well defined from the inner supra-orbital angles beyond which it projects slightly, three lobed, between a fourth and a fifth the greatest breadth of the carapace in width.

Antero-lateral borders thin, oblique, arched, cut into five teeth including the outer orbital angles, shorter than the postero-lateral borders.

Orbits with one faint notch in the upper and one in the concave lower border, the inner angle of the lower border dentiform but not very prominent. The antennules fold obliquely, but nearer the transverse than the longitudinal.

Basal antenna-joint slightly longer than broad, fixed; the flagellum, which is not very long, stands in the orbital hiatus.

Buccal cavern square, its greatest length a little more than its greatest breadth: the external maxillipeds are rather elongate, especially the merus which projects somewhat beyond the level of the edge of the endostome: epistome lozenge-shaped. The ridges that define the efferent branchial canals do not approach the edge of the endostome.

Chelipeds massive, just shorter than any of the first three pairs of legs, slightly unequal: arm short, without any spines: inner angle of wrist alone spiniform: no spines on the hand, which is deep and not prismatic: fingers stout, a little shorter than the palm, not very strongly toothed.

Legs stoutish: the last pair have the merus elongate and unarmed, the carpus not dilated, the propodite shortened and somewhat broadened, and the dactylus acutely lanceolate.

The abdomen of the male consists of five pieces, the 3rd-5th terga being fused.

*Carcinus* exhibits the relation of the Portunidæ to other Cyclo-metopan families, being related to *Pirimela* among the Cancridæ and to *Hoploxanthus* among the Xanthidæ.

1. *Carcinus mænas*, (Linn.).

*Cancer marinus sulcatus*, Rumph, Amboinsch. Bariteitk. pl. vi. fig. O.

*Cancer mænas*, Linnæus, Fauna Suecica p. 492; Mus. Ludov. Ulric. p. 436; and Syst. Nat. (xii) I. p. 1043: ["Pennant Brit. Zool. IV. p. 3, pl. iii. fig. 5" sec. Milne Edwards]: Baster, Naturkundige Uitspanningen Zeeplanten en Zee Insekten, Haarlem 1765, II. pl. ii. figs. 1-3: Herbst, Krabben, I. ii. 145, pl. vii. fig. 46: Fabricius, Ent. Syst. II. p. 450, and Suppl. p. 334: Bosc, Hist. Nat. Crust. I. p. 173, pl. iii. fig. 1: Latreille, Hist. Nat. Crust. V. p. 363: Risso, Hist. Nat. Crust. Nice, p. 12: Lamarck, Hist. Nat. Anim. sans Vertèbr. V. Crust. p. 270: Dumeril in Dict. Sci. Nat. XI. 1818, p. 299: de Brebisson, Mem. Soc. Linn. Calvados, 1825, p. 233.

*Portunus mænas* ["Leach, Edinb. Encycl. VII. p. 390" sec. Milne Edwards]: Costa, Faun. Regn. Napoli, Crust. Brach. p. 7.

*Carcinus mænas*, ["Leach, Edinb. Encycl. VII. p. 429" sec. Milne Edwards]; and Trans. Linn. Soc. XI. 1815, p. 314; and Malac. Pod. Brit. pl. v: Desmarest, in Dict. Sci. Nat. XXVIII. 1823, p. 217; and Consid. Gen. Crust. p. 91: Risso, Hist. Nat. Eur. Mérid V. Crust. p. 7: Audouin, Explic. p. 84: Savigny Descr. Egypt. Crust. pl. iv. fig. 6: Milne Edwards in Cuvier Règne Anim. pl. x. fig. 3 and Hist. Nat. Crust. I. 434: ["Gould, Report on the Invertebrata of Massachusetts, p. 321" sec. A. Milne Edwards]: De Kay, Zoology of New York, pt. VI. Crust. p. 8, pl. v. figs. 5, 6: Lucas, Hist. Anim. Artic. in Expl. Sci. Algerie, Zool. I. i. p. 13; and Hist. Nat. Anim. Art. p. 95: Bell, British Stalk-eyed Crust. p. 76: Salter, Journ. Linn. Soc., Zool., IV. 1860, p. 34 (*process of moulting*): A. Milne Edwards, Archiv. du Mus. X. 1861, p. 391: Van Beneden, Rech. Faun. Litt. Belg. p. 133: Heller, Crust. Sudl. Europ. p. 91, pl. ii. figs. 14, 15; and Novara Crust. p. 30: W. C. McIntosh, Trans. Linn. Soc. XXIV. 1864, p. 79, pl. xix., xx. (*on the various kinds of hairs*): Sars, vide Zool. Rec. III. 1866, p. 224: Nardo, Annot. Crust. p. 87: Wood-Mason, Proc. Asiatic Soc. Bengal, 1873, p. 172, and Ann. Mag. Nat. Hist. (4) XII. 1874, p. 405: Brocchi, Ann. Sci. Nat. (6) II. 1875, Art. 2, p. 62, pl. xvi. figs. 89, 90, 100, 101. (*male parts*): Streets, Bull. U. S. Nat. Mus. VII. 1877, p. 109: Meinert, Nat. Tids., Copenhagen, (3) XI. 1877, p. 222, and (3) XII. 1879, p. 507: Kingsley, Proc. Ac. Nat. Sci. Philad. XXX. 1878, p. 321, and XXXI. 1879, p. 398; Nauck, Zeits. Wiss. Zool. XXXIV. 1880, p. 56 (*gastric teeth*): Boas, Stud. Decapod. (Vid. Selsk. Skr. (6) I. 2) p. 141: S. I. Smith, Trans. Conn. Acad. V. p. 34: Carrington and Lovett, Zoologist (3) VI. 1882, p. 12: Carus, Prodr. Faun. Medit. I. p. 518: Cano, Boll. Soc. Nat. Napol. III. 1889, p. 222: Mobius, SB. A.K. Berl. 1893, pp. 75, 76: Ortmann, Zool. Jahrb. Syst., etc., VII. 1893-94, p. 423: Birula, Ann. Mus. Zool. Petersb. 1897, p. 448.

Carapace about three-fourths as long as broad, the regions fairly well defined, the gastric being divided into three areolæ, the surface finely granular, especially in the anterior half.

Front cut into three lobes, of which the middle one is acuminate.

Antero-lateral borders rather shorter than the postero-lateral, cut into five anteriorly-acuminate teeth. Posterior border forming a curve with the postero-lateral borders.

Orbits without any particular dorsal inclination, their major diameter about half the width of the inter-orbital space. Antennal flagella about  $1\frac{1}{2}$  times the length of the orbit.

Chelipeds a little unequal, the longer one is less than  $1\frac{1}{2}$  times the length of the carapace: the inner angle of the wrist is spiniform and there are two costæ along the upper surface of the hand, otherwise they are smooth and unsculptured. Palm deep and full, but not inflated, fingers stout, nearly as long as the palm in the shorter cheliped only.

Legs stout, smooth, unarmed: the 2nd and 3rd pairs, which are the longest, are about  $1\frac{3}{4}$  times the length of the carapace: the fourth pair, which are also slightly longer than the larger cheliped, are a little shorter than the first pair.

Sixth abdominal tergum of male about twice as broad as long, with gradually convergent sides.

In the Indian Museum is a single male from Galle (Ceylon), besides numerous specimens from the Mediterranean and the North Sea.

The geographical distribution of *Carcinus mænas* has been referred to by several of the authors above-cited. The species has been found at various places on the Atlantic coast of the Northern United States and off the coast of Pernambuco (Brazil): it is the common shore-crab of the British Islands, and occurs in the North Sea almost up to Arctic limits, in the Baltic, and on the Atlantic coasts of the European continent: it is common in all parts of the Mediterranean, and has been found in the Black Sea and the Red Sea: it is an Indian species, though evidently a very rare one, and has been reported from the Hawaiian Islands, from the Bay of Panama, and—though there is doubt about this locality—from Australia.

Its range in fact corresponds very nearly with that of the Macruroid fish *Macrurus* (*Malacocephalus*) *lævis* Lowe, and recalls that of the Perciform fish *Lobotes surinamensis*.

In an *Account of the Investigator Deep Sea Madreporaria*, recently published by the Trustees of the Indian Museum, I have given lists of 43 species of marine animals that are common to the slopes (including both American and European sides) of the Atlantic and of the Oriental Region and Western Pacific, and in a subsequent *Account of the Investigator Deep Sea Brachyura*, also published by the Trustees of the Indian Museum, I have added several species of Crabs that are found both in American-Atlantic and in East-Indian waters: moreover, Captain A. R. S. Anderson, who is engaged in examining the Investigator Echinoids, has discovered some interesting affinities between the West-Indian, the Mediterranean, and the Oriental Echinoid fauna. So that the distribution of *Carcinus mænas* is not so singular as has been supposed.

The significance of this distribution has been discussed in the works just cited: it is emphasized by the fact that *Carcinus mænas* is a shore-crab.

## Sub-family II. PORTUNINÆ.

## BENTHOCHASCON, Alcock.

*Benthochascon Hemingi*, Alcock and Anderson, Ann. Mag. Nat. Hist., Jan. 1899, p. 10.

*Benthochascon*, Alcock, Investigator Deep Sea Brachyura, p. 68.

Carapace sub-quadrate, nearly as broad as long, its anterior portion arched and declivous, its posterior portion flat, the regions hardly defined: no transverse ridges.

Front not very well demarcated from the inner supra-orbital angles, about a fourth the greatest breadth of the carapace in width, cut into 3 (or 4) teeth.

Antero-lateral borders much shorter than the postero-lateral, cut into four teeth including the outer orbital angle. Posterior border broadly excised.

Orbits with indistinct traces of two grooves in the upper border, the lower border concave with the inner angle dentiform and prominent. The antennules fold nearly transversely.

Basal antennal joint short, but longer than broad, freely movable; the flagellum, which is not very long, stands in the orbital hiatus.

Epistome of good length fore-and-aft, not only in the middle but at the sides, well delimited from the palate, not encroached upon by the external maxillipeds. Buccal cavern square, rather broader than long; the external maxillipeds not elongate, their merus as broad as long. The efferent branchial channels defined by ridges.

Chelipeds massive, shorter than any of the first 3 pair of legs, slightly unequal: arm short, without spines: inner angle of wrist alone spiniform: hand deep, smooth or nearly so: fingers stout, as long as or longer than hand, strongly toothed.

Legs stoutish: in the last pair the merus is elongate, the carpus is shortened and somewhat broadened, and the propodite and dactylus are typically foliaceous for swimming.

2. *Benthochascon Hemingi*, Alcock and Anderson.

*Benthochascon Hemingi*, Alcock and Anderson, Ann. Mag. Nat. Hist., January, 1899, p. 10: Alcock, Investigator Deep Sea Brachyura, p. 69, pl. iii. fig. 2.

Carapace almost as broad as long, smooth (though finely frosted) except for slight inequalities of level that scarcely define the regions, strongly declivous in its anterior third.

Front cut into three lobes of which the middle one is bifid at tip: the front is separated from the inner supra-orbital angles by a groove, not by a notch.

Antero-lateral borders considerably less than two-thirds the length of the postero-lateral, cut into four teeth (including the outer orbital angle) of which the last is spiniform and is rather remote from the others.

Posterior border peculiar in being quite flush with the surface of the carapace, and concave or broadly excised.

Orbits large, their major diameter three-fourths the width of the front, without any dorsal inclination: there are two indistinct grooves in the upper border, and the lower border is concave with the inner angle prominent and acutely dentiform. Eyes large, placed mostly on the ventral surface of the eyestalk.

Antennal flagella not much longer than the orbit.

The external maxillipeds fall considerably short of the anterior edge of the palate.

Chelipeds somewhat unequal, the larger one is between  $1\frac{1}{2}$  and  $1\frac{2}{3}$  times the length of the carapace: except for a sharp tooth at the inner angle of the wrist, and for a small sharpish tubercle at the far end of the sharply-defined inner border of the hand, they are smooth and unsculptured. The hands are full and very deep: the fingers are stout but end in acute hooked tips: in the smaller cheliped, but not in the larger cheliped, they are longer than the hand.

Legs stoutish, compressed, a notch and tooth at the far end of the anterior border of the merus of all. The 2nd pair, which are slightly longer than the 1st and 3rd, are from  $1\frac{1}{3}$  times to twice the length of the carapace: all three end in a very acute styliform dactylus. The 4th pair, which are about equal in length to the chelipeds, have the merus four times as long as broad, the carpus not particularly dilated, and the propodite and dactylus typically foliaceous and blade-like, the dactylus however ending in an acutely mucronate tip: the posterior border of the merus is unarmed.

In the Indian Museum are two specimens, both females, from the Andaman Sea 185 and 405 fms. The carapace of the larger one is 48 millim. long and 51 millim. broad.

#### PARATHRANITES, Miers.

*Lupocyclus (Parathranites) orientalis*, Miers, Challenger Brachyura, p. 186.

Carapace hexagonal, convex, moderately transverse, the regions well defined and with some definitely-placed tubercles but no transverse ridges.

The front, which projects beyond the ill-defined inner supra-orbital angles, is less than a fourth the greatest breadth of the carapace in width, and is cut into four teeth.

Antero-lateral borders oblique, not much curved, cut into five teeth including the outer orbital angles.

Orbits with two wide fissures in the upper margin, the lower margin concave with the inner angle dentiform and prominent. The antennules fold transversely.

Basal antennal joint longer than broad, slender, not nearly filling the orbital hiatus, movable; the flagellum, which stands in the orbital hiatus, long.

Epistome short fore and aft, sunk; though well enough delimited from the palate somewhat encroached upon by the external maxillipeds. Buccal cavern square, its greatest length about equals its greatest breadth: external maxillipeds rather elongate, especially the merus.

Chelipeds moderately massive, shorter than any of the first 3 pair of legs; arm wrist and hand with spines; hand prismatic, fingers stout and strongly toothed.

Legs long and slender: in the fourth pair the merus and carpus though shortened are not much broadened, and the propodite and dactylus are foliaceous and typically paddle-like.

The abdomen of the male consists of 5 segments, the 3rd-5th terga being fused.

As Miers says, this genus is allied to *Bathynectes*: in fact it is nearer to *Bathynectes* than to *Lupocyclus*.

### 3. *Parathranites orientalis*, Miers.

*Lupocyclus* (*Parathranites*) *orientalis*, Miers, Challenger Brachyura, p. 186, pl. xvii. fig. 1.

Carapace about three-fourths as long as broad (spines included), decidedly convex, the regions well demarcated, the surface granular and somewhat hairy—especially at the antero-lateral margins. There is always a tubercle in the middle line on the posterior part of the gastric region and sometimes three, in a transverse series, in front of it: there are one, or two close side-by-side, in the middle of the cardiac region, and from two to four in a fairly longitudinal series along the inner limit of either epibranchial region.

Front hardly delimited from the almost obsolete inner supra-orbital angles beyond which it projects, cut into four horizontal subacute teeth of nearly equal size.

Antero-lateral borders cut into 5 teeth, of which the first (the outer orbital angle) is remarkably prominent, the next three are very acutely anteriorly-acuminate, and the last—equally acute—stands out nearly at right angles to the others.

Posterior border nearly straight, making a dentiform angle of junction with the postero-lateral borders.

Orbits deep, without any particular dorsal inclination, their major diameter nearly equal to the width of the front; the inner angle of the lower border bilobed, the inner lobe dentiform and projecting beyond the level of the tips of the frontal teeth.

Merus of external maxillipeds produced a good deal beyond the articulation of the flagellum.

Chelipeds moderately massive, their length not  $1\frac{1}{2}$  times that of the carapace: a spinule at the far end of the anterior border of the ischium: a spine near the middle of the anterior border, and a spinule near the far end of the posterior border, of the arm: the inner angle of the wrist is produced to form a spine nearly half as long as the palm, and on the outer surface of the wrist are 3 spinules of which one is almost a spine: hand not inflated, its upper surface with 2 costæ and 3 spines of which the one at the far end of the inner border is the largest; a faint ridge along the outer surface of the hand, and one or two along the inner surface: fingers stout, nearly as long as the hand.

First 3 pair of legs long and slender, the first pair well over twice the length of the carapace. The fourth pair are very little shorter than the chelipeds and have the merus slender and quite unarmed.

2nd and 3rd abdominal terga strongly carinated in both sexes: the 6th tergum of the adult male is nearly as long as broad and has nearly parallel sides.

Colours in life salmon-pink above, tips of spines red.

In the Indian Museum are 54 specimens from off the Malabar coast 56-68 fms., off the Coromandel coast 33 fms., and from the Andamans.

The carapace of the largest specimen is 12 millim. long and 17 millim. broad.

## Sub-family II. CAPHYRINÆ.

### LISSOCARCINUS. Adams and White.

*Lissocarcinus*, Adams and White, *Samarang Crust.* p. 45: A. Milne Edwards, *Ann. Sci. Nat. Zool.*, (4) XIV, 1860, p. 228, and *Archiv. du Mus.* X. 1861, p. 417: Miers, *Challenger Brachyura*, p. 204.

*Asecla*, Streets, *Bull. U. S. Nat. Mus.* VII. 1877, p. 110.

Carapace either not, or very little, broader than long, smooth or with a single ridge running obliquely inwards from the last tooth of either antero-lateral border.

Front prominent beyond the inner supra-orbital angles which may be either well or rather ill defined, laminar, subentire or distinctly notched

in the middle line, its breadth (exclusive of the inner supra-orbital angles) is from half to a third the greatest width of the carapace.

Antero-lateral borders little oblique, moderately arched, cut into five lobes or teeth, including the outer orbital angle.

Basal antenna-joint short but not peculiarly broad, its outer angle is produced as a lobule that meets the front and fills the orbital hiatus so as to exclude the flagellum.

The two fissures in the upper edge of the orbit may be distinct, or may be almost indistinguishable. The antennules fold nearly transversely or a little obliquely.

Epistome short, and though well enough demarcated from the palate, somewhat overlapped by the external maxillipeds. Buccal cavern squarish, broader than long, the efferent branchial channels well defined.

Chelipeds short, but a little longer than the legs: arm short, without any distinct spines, only the inner angle of wrist dentiform; palm not prismatic, fingers stout and rather shorter than the palm.

The propodite and dactylus of the last pair of legs are typically foliaceous swimming paddles, but the carpus and merus are not particularly dilated.

The abdomen of the male consists of 5 pieces, the 3rd-5th terga being fused.

*Lissocarcinus* is distinguished from *Thalamonyx* chiefly by the sub-circular or obovate carapace and by the stumpy little sculptured chelipeds.

#### *Key to the Indian species of Lissocarcinus.*

- I. Carapace as long as broad, flat, obovate; front broadly triangular, notched at tip ... .. *L. polybioides*.
- II. Carapace broader than long, convex:—
  1. Carapace sub-rotund; front sub-entire, being dorsally grooved but not notched in the middle line, supra-orbital angles obscurely defined ... .. *L. orbicularis*.
  2. Carapace distinctly broader than long; front cut into two broad lobes exclusive of the well defined dentiform supra-orbital angles ... .. *L. laevis*.

#### 4. *Lissocarcinus polybioides*, Adams and White.

*Lissocarcinus polybioides*, Adams and White, Samarang Crust. p. 46, pl. xi. fig.

5: A. Milne Edwards, Archiv. du Mus. X. 1861, p. 417: Haswell, Cat. Austral. Crust. p. 83: Miers, Challenger Brachyura, p. 205: J. R. Henderson, Trans. Linn. Soc. Zool., (2) V. 1893, p. 378.



Carapace as long as broad, obovate with the posterior part truncated and much constricted, flat, smooth except for a low transverse ridge passing obliquely inwards from the last tooth of either antero-lateral border.

Front projecting far beyond the well pronounced inner supra-orbital angles, lamellar, horizontal, broadly triangular with the apex rather deeply notched: its breadth (not including the inner supra-orbital angles) is a little less than half the greatest breadth of the carapace.

Antero-lateral borders curved, cut into 5 anteriorly acuminate teeth (including the outer orbital angles) of which the first is the largest and the 5th the smallest.

Posterior border of dorsum of carapace forming a curve with the postero-lateral borders.

Orbits small, their major diameter less than a third the width of the inter-orbital space; two faint grooves in the upper border, the inner angle of the lower border dentiform but not prominent.

Chelipeds moderately stout, longer and stouter than the legs, a little longer than the carapace: inner angle of wrist dentiform, two or three little points—of which one is slightly larger than the others—on the outer angle: hand smooth, except for 2 crests—each of which ends in a tooth—on the upper surface, and for a small tubercle in front of the apex of the wrist-joint: fingers stout, a little shorter than the palm.

Merus of last pair of legs twice as long as broad, its posterior border, like that of the propodite, is smooth and unarmed.

6th abdominal tergum of male longer than broad, with slightly-curved gradually convergent sides.

Sternum elongate-oval particularly so in the male.

In the Indian Museum are 11 specimens, from Madras, from Orissa and Ganjam coasts 13–28 fms., from Malabar coast 28 fms., and from the Andamans.

A small species: the carapace of an egg-laden female is 7 millim. in both diameters.

### 5. *Lissocarcinus orbicularis*, Dana.

*Lissocarcinus orbicularis*, Dana, Proc. Ac. Nat. Sci. Philad. 1852, p. 86, and U. S. Expl. Exp. Crust. pt. I. p. 288, pl. xviii. fig. 1a-e: A. Milne Edwards, Archiv. du Mus. X. 1861, p. 418: Richters in Mobius Meeresf. Maurit. p. 154: Miers, Zool. H. M. S. Alert, pp. 518, 541, and P. Z. S. 1884, pp. 10, 12, and Challenger Brachyura, p. 205: Ortmann, Zool. Jahrb., Syst., VII. 1893-94, p. 87.

*Lissocarcinus pulchellus*, Muller, Verh. Nat. Ges. Basel, VIII. pp. 475, 482, pl. v. fig. 6.

Carapace slightly broader than long, sub-circular, convex with thin edges, smooth except for a more or less distinct ridge or elevation running obliquely inwards from the last tooth of either antero-lateral border.

Front projecting a little beyond the supra-orbital angles (which are not well pronounced), arched, entire though dorsally concave in the middle line, its breadth is between a half and a third the greatest breadth of the carapace.

Antero-lateral borders curved, divided into five lobes, or, rather, broad flat puckers.

Orbits small, their major diameter is about a fourth the width of the inter-orbital space: two closed fissures near the outer end of the upper margin; inner angle of lower margin dentiform but not prominent.

Antennal flagella short.

Chelipeds a little longer than the carapace: inner angle of wrist dentiform: upper surface of hand with two carinæ, each ending in a blunt tooth, there is also a little tubercle in front of the apex of the wrist joint and an obscure ridge along the outer surface: fingers stout, a little shorter than the palm, the dactylus sharply carinate dorsally.

Legs stout, slightly shorter than the chelipeds, the merus of the last pair is about twice as long as broad and its posterior border, like that of the propodite, is smooth.

Colours very characteristic: carapace dark maroon (chocolate in spirit) with symmetrical yellow markings, chelipeds and legs cross-banded yellow and maroon.

In the Indian Museum is a single egg-laden female from Kiltán I. (Laccadives): its carapace is 10 millim. long and 11·5 millim. broad.

#### 6. *Lissocarcinus lævis*, Miers.

*Lissocarcinus lævis*, Miers, Challenger Brachyura, p. 205, pl. xvii, fig 3: J. R. Henderson, Trans. Linn. Soc. Zool., (2) V. 1893, p. 378.

Carapace distinctly broader than long, convex, perfectly smooth.

Front a little prominent beyond the well pronounced supra-orbital angles, divided into two broad lobes, its breadth (not including the supra-orbital angles) is barely a third the greatest breadth of the carapace.

Antero-lateral borders curved, cut into 5 blunt lobes, of which the first and last are the smallest.

Orbits large, their major diameter nearly half the width of the inter-orbital space, their upper border entire, though traces of the two sutures may be visible.

Chelipeds rather longer than the carapace; a small lobule at the far end of the anterior border of the arm, inner angle of wrist stoutly spiniform, hand smooth except for a tiny tubercle in front of the apex of the wrist joint.

First 3 pairs of legs slender: merus of last pair less than twice as long as broad, its posterior border ending in an almost dentiform carina.

6th abdominal tergum of male broader than long, broadest in the middle, its sides therefore curved.

In spirit the carapace is white with some purplish-brown markings.

In the Indian Museum are 9 specimens, from off Ceylon  $26\frac{1}{2}$  fms., off the Malabar coast 26–31 fms., off Mergui 40 fms. and from the Andamans.

The largest specimen has a carapace 9.5 millim. long and 11 millim. broad.

### Sub-family III. LUPINÆ.

#### Alliance I. *Lupocycloida*.

#### LUPOCYCLUS, Adams and White.

*Lupocyclus*, Adams and White, Samarang Crust. pp. 46, 47: A. Milne Edwards, Ann. Sci. Nat., Zool., (4) XIV. 1860, p. 228, and Archiv. du Mus. X. 1861, p. 337: Miers, Challenger Brachyura, p. 185 (not subgenus *Parathranites*).

Carapace little broader than long, or even sub-circular, convex, the regions faintly indicated, with granular transverse ridges of definite position.

Front proper (not including the rather obscurely defined reduplicated inner supra-orbital angles) prominent and cut into 4 teeth.

Antero-lateral borders moderately oblique and moderately curved, about equal in length to the postero-lateral, cut into 5 or 6 teeth (including the outer orbital angle) with little denticles in some or all of the interdental spaces, bringing the total number to 9. (The denticles are sometimes so small as to escape notice).

Orbits large with a considerable dorsal inclination: the upper border with 2 fissures: the inner angle of the lower border though dentiform does not project anywhere near the level of the tips of the middle frontal teeth. The antennules fold transversely.

Basal antenna-joint about as long as broad, filling the orbital hiatus; not quite firmly fixed; flagellum long, standing in the orbital hiatus.

Epistome short, somewhat sunken. Buccal cavern somewhat broader than long efferent branchial channels well defined.

Chelipeds very long, much longer than any of the legs, rather slender, the hand slenderer than the arm: the arm with spines, both inner and outer angles of wrist spiniform, the hand with spines and costæ, the fingers long and slender.

Legs slender: propodite and dactylus of last pair typically foliaceous and blade-like for swimming.

Abdomen of male five-jointed the 3rd-5th terga being fused: the first tergum almost concealed beneath the carapace.

### *Key to the Indian species of Lupocyclus.*

- I. Frontal teeth blunt-pointed; chelipeds less than three times the length of the carapace, the arm being stout and prismatic: merus of last pair of legs broadened and compressed ... .. *L. rotundatus.*
- II. Frontal teeth acutely pointed: chelipeds more than three times the length of the carapace, the arm being slender and cylindrical: merus of last pair of legs slender ... .. *L. strigosus.*

### 7. *Lupocyclus rotundatus*, Adams and White.

*Lupocyclus rotundatus*, Adams and White, Samarang Crust. p. 47, pl. xii. fig. 4:

A. Milne Edwards, Archiv. du Mus. X. 1861, p. 387: de Man, Notes Leyden Mus. V. 1883, p. 153: Miers, Zool. H. M. S. Alert, pp. 184, 234, and Challenger Brachyura, p. 186. See also de Man, Zool. Jahrb., Syst. etc., II. 1886-87, p. 718.

? *Goniosoma inæquale*, Walker, Journ. Linn. Soc., Zool., XX. 1886-90 (1887) p. 116, pl. viii. fig. 4.

? *Lupocyclus inæqualis*, Henderson, Trans. Linn. Soc. Zool. (2) V. 1893, p. 378.

Carapace sub-circular in the young but becoming as much as five-sixths as long as broad in large individuals, convex, subtomentose, its surface broken by transverse granular ridges which are similar in number and position to those of *Neptunus (Lupocyclusporus) whitei* A. M. Edw. but are more elevated and discontinuous and therefore look more like series of tubercles.

Front prominent beyond the dorsally-grooved, or reduplicated, inner supra-orbital angles, cut into four teeth of not very unequal size, of which the middle two are the most prominent and the most acute. Supra-orbital margin with two sutures or not very open fissures.

Antero-lateral borders cut into five rather coarse teeth (including the outer orbital angle), and in every one of the interdental spaces there is a denticle: these intervening denticles are so small in young individuals that some of them may escape notice, but in large individuals they are all very distinct. Posterior border straight, but forming a curve with the postero-lateral borders.

Antennal flagella more than half as long as the carapace.

Chelipeds rather more than  $2\frac{1}{2}$  times the length of the carapace in the male, and having the same form and proportions as those of *Neptunus* (*Lupocyclus*) *whitei*, the arm being much stouter than the hand and the surface of most of the segments being granular with a squamiform sculpture: 5 spines on the anterior border of the arm and 2 in the distal third of the posterior border: hand and wrist slender, costate—the costæ granular: a spine at the inner and the outer angles of the wrist: hand with 3 spines, one being in front of the apex of the wrist-joint, the other two being side by side some little distance behind the finger-joint. The fingers are stoutish, as long as the hand, and are gently incurved, but have the extreme tips sometimes slightly bent outwards: their opposed edges have jagged teeth like those of any *Neptunus*.

The first three pair of legs are slender. The fourth pair have all their joints broadened as in any *Neptunus*, though the merus and carpus are not quite so broad, relatively, as in that genus; there is a spine near the far end of the posterior border of the merus of this pair.

The 2nd and 3rd abdominal terga are sharply and decidedly carinate.

In the Indian Museum are 14 specimens representing both sexes and several ages, from the Andaman Sea up to 55 fms. and from off Ceylon  $26\frac{1}{2}$ –32 and 34 fms. The largest male has the carapace 15 millim. long and 19 millim. broad, but there are two egg-laden females only about half this size.

The four smallest specimens are identical with White's figure of *Impocyclus rotundatus*, the two largest specimens agree with Walker's description and figure of *Goniosoma inæquale*, the six middle-sized specimens cannot be decisively separated from either: I therefore think that all belong to one species.

#### 8. *Lupocyclus strigosus*, n. sp.

(an *Lupocyclus philippinensis*, Semper, Nauck ?)

Except in the form of the chelipeds (which are even slenderer than those of *Lupa forceps*) and last pair of legs, this species is very much like *L. rotundatus*, from which it differs in the following characters:—

(1) the carapace is perhaps a little more nearly circular, and is distinctly more convex:

(2) the front is more prominent, is practically confluent with the inner supra-orbital angles, and is cut into four sharp teeth, of which the middle two are much smaller than the others:

(3) the antero-lateral borders are armed with five slender spini-form teeth *not* including the outer orbital angle, and the denticles of the interspaces are represented by granules or are quite inconspicuous :

(4) the chelipeds in the male are  $3\frac{1}{4}$  times the length of the carapace and are very slender, especially in the palm : there are 6 or 7 spines along the anterior border of the arm, which is a slender cylindrical joint, and two much smaller ones in the distal fourth of the posterior border : the fingers are considerably longer than the palm, are extremely slender, and their opposed edges are armed with close-set fine regular teeth having larger acicular teeth at fairly regular intervals—much as in the Leucosine genus *Arcania* :

(5) the last pair of legs, though otherwise similar to those of *L. rotundatus*, have the basal joints, up to and including the carpus, slender, sub-cylindrical, and, in fact, hardly stouter than the corresponding joint of the other legs.

In other respects this species agrees with *L. rotundatus*.

In the Indian Museum are five specimens—from the Andaman Sea 15 fms., from off the Madras coast, 33 fms., and from off the Konkan coast, 56–58 fms.

In the type specimen the carapace is 8 millim. long and 9 millim. broad.

#### CARUPA, Dana.

*Carupa*, Dana, Silliman's Amer. Journ. Sci. and Arts (2) XII. 1850, p. 129; Proc. Ac. Nat. Sci. Philad. 1852, p. 85; and U. S. Expl. Exp. Crust. pt. I. p. 279; A. Milne Edwards, Ann. Sci. Nat., Zool., (4) XIV. 1860, p. 228, and Archiv. du Mus. X. 1861, p. 386.

Carapace transverse, broad, moderately convex, with smooth unbroken surface.

The front proper projects slightly beyond the rather ill-defined inner supra-orbital angles, and is either broadly bilobed or cut into four shallow lobes : its breadth is about a fourth the greatest breadth of the carapace.

Antero-lateral borders moderately oblique and arched, about the same length as the postero-lateral, cut into 7 rather irregular lobes (including the outer orbital angles).

The orbit, which has little or no dorsal inclination, has two notches in its upper border ; the lower border crenulate. The antennules fold almost transversely.

Basal antenna-joint as long as broad, rather slender ; the flagellum, which is of moderate length, stands in the orbital hiatus.

Epistome sufficiently long. Buccal cavern squarish, broader than long, the efferent branchial channels very well defined.

Chelipeds longer and vastly more massive than the legs: arm with spines, one or both angles of wrist spiniform; palm inflated, massive, nearly smooth: fingers stout, hardly as long as palm, strongly toothed.

Legs slender: in the fourth pair the merus is elongate and the carpus slender, but the propodite and dactylus are typical swimming paddles.

First abdominal tergum narrow, almost hidden by the carapace: in the male the 2nd-5th terga are fused—though the suture between the 2nd and 3rd may be visible—so that the abdomen consists of 4 pieces only.

#### 9. *Carupa læviuscula*, Heller.

*Carupa læviuscula*, Heller, Verh. zool. bot. Ges. Wien, XII. 1862, p. 520, and Novara Crust., p. 27, pl. iii. fig. 2: de Man, Notes Leyden Mus. V. 1883, p. 152, and Archiv. f. Naturges. LIII. 1887, i. p. 336: Ortmann, Zool. Jahrb., Syst. VII. 1893-94, p. 68 and in Semon's *Forschung. Crust.* (Jena. Denk. VIII) p. 44: Zehntner, Rev. Suisse Zool. II. 1894, p. 161.

Carapace about  $\frac{2}{3}$  as long as broad, perfectly smooth to the naked eye, frosted with minute granules under the lens.

Front cut into 4 shallow lobes, of which the middle two are the narrowest. Supra-orbital margin with two notches, infra-orbital margin cut into four lobes of which the middle two are the narrowest.

Antero-lateral borders cut into 7 teeth (including the outer orbital angle), of which the 5th is the smallest and the 6th the largest and most acute. The postero-lateral angles of the carapace are well defined.

Antennal flagella more than half the length of the carapace.

Chelipeds about  $2\frac{1}{4}$  times the length of the carapace, in the male: arm short with 3 claw-like spines on the anterior border, the posterior border being smooth: inner angle of wrist strongly spiniform, the outer angle rounded, but armed with a spinule below: hand smooth, its upper border well defined.

In young specimens, as in the young of *Scylla serrata*, there may be two faint costae or two lines of small granules along the upper surface of the hand, and also there may be some costiform lines of small granules on the upper surface of the wrist.

The legs are slender and smooth: the last pair have only the last two joints dilated for swimming.

In the Indian Museum are two specimens (one badly damaged) from the Andamans and one from the Madras coast—besides one from Samoa and one from Mauritius.

Alliance II. *Lupoida.*

## SCYLLA, De Haan.

*Scylla*, De Haan, Faun. Japon. Crust. p. 11: A. Milne Edwards, Ann. Sci. Nat., Zool., (4) XIV. 1860, pp. 228, 249, and Archiv. du Mus. X. 1861, p. 347: Miers, Challenger Brachyura, p. 184.

Carapace transverse, broad, moderately convex, with an almost unbroken surface.

Front proper well delimited from the inner supra-orbital angles, cut into four teeth: its breadth (not including the supra-orbital angles) is between a fourth and a fifth the greatest breadth of the carapace.

Antero-lateral borders oblique, arched, longer than the postero-lateral, cut into 9 teeth of nearly equal size.

Orbit without any dorsal inclination: two nearly closed fissures in its upper wall: the inner angle of the lower border dentiform and prominent. The antennules fold nearly transversely.

Basal antenna-joint short and broad, its antero-external angle produced to form a lobule lying in the orbit: the flagellum, which is of good length, stands in the orbital hiatus.

Epistome sufficiently long fore and aft, not sunken. Buccal cavern squarish, broader than long: the efferent branchial channels cavernous, but not defined by ridges.

Chelipeds massive, longer than any of the legs: arm wrist and hand with definitely placed spines: hand deep and full, not prismatic, not costate.

Legs stout, moderately compressed: in the fourth pair the merus and carpus are shortened and broadened, and the propodite and dactylus are typically foliaceous for swimming.

Abdomen of male rather broadly triangular, consisting of 5 segments, the 3rd-5th terga being fused. The first tergum is much concealed beneath the carapace.

10. *Scylla serrata* (Forsk.) De Haan.

*Cancer serratus*, Forskal, Descr. Anim. p. 90.

*Cancer olivaceus*, Herbst, Krabben, II. V. 157, pl. xxxviii. fig. 3.

*Portunus tranquebaricus*, Fabricius, Ent. Syst. Suppl. p. 366; Bosc, Hist. Nat. Crust. I. p. 219; Latreille, Hist. Nat. Crust. VI. p. 16 and Encycl. Meth. X. p. 191.

*Portunus serratus*, Rüppell, 24 Krabben roth. Meer. p. 10, pl. ii.

*Lupea tranquebarica*, Milne Edwards, Hist. Nat. Crust. I. 448.

*Lupea lobifrons*, Milne Edwards, Hist. Nat. Crust. I. 453 (*vide* A. M. Edw.).

*Scylla serrata* De Haan, Faun. Japon. Crust. p. 44: Krauss, Sudafr. Crust. p. 25: A. Milne Edwards, Ann. Sci. Nat. Zool. (4) XIV. 1860, p. 252, and Archiv. du Mus. X. 1861, p. 349, and Nouv. Archiv. du Mus. IX. 1873, p. 162, and in Maillard's



Île Reunion, Annexe F p. 2: Hess Archiv. f. Naturges. XXXI. 1865, i. pp. 139, 172: Heller, Novara Crust. p. 27: Miers, Crust. New Zealand, p. 27: Hilgendorf, MB. A.K. Berl. 1878, p. 799: E. Nauck, Zeits. Wiss. Zool. XXXIV. 1880, p. 59, pl. i. figs. 22, 24 (*gastric teeth*): Haswell, Cat. Austral. Crust. p. 79: Miers, Ann. Mag. Nat. Hist. (5) V. 1880, p. 238; and Zool. H. M. S. Alert, pp. 518, 538; and Challenger Brachyura, p. 185: Filhol, Crust. N. Zel., Miss. ile Campbell, p. 382: de Man, Archiv. Naturges. LIII. 1887, i. p. 332; and in Weber's Zool. Ergebn. Niederl. Ost. Ind. II. 1892, p. 285: Cano, Boll. Soc. Nat. Napol. III. 1889, p. 215: Ortmann, Zool. Jahrb. Syst. VII. 1893, p. 78, and in Semon's Forschungsgr. (Jena-Denk. VIII.) Crust. p. 45: Henderson, Trans. Linn. Soc. Zool., (2) V. 1893, p. 372.

*Scylla tranquebarica*, Dana, U. S. Expl. Exp. Crust. pt. I. p. 270: Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 38.

? *Achelous crassimanus*, Macleay Ill. Annulosa. S. Afr. p. 61, (sec. A. M. E.).

Carapace about  $\frac{2}{3}$ , or a little less, as long as broad, practically smooth, except for a faint granular ridge running obliquely inwards across either branchial region from the last spine of the antero-lateral border.

Front cut into four lobes or bluntish teeth of about equal size and prominence. Antero-lateral borders cut into 9 sharply acuminate teeth of about equal size: posterior border forming a curve with the postero-lateral borders, the points of junction sometimes slightly thickened.

Merus of external maxillipeds oblique but not having the antero-external angle distinctly produced in a lateral direction.

Chelipeds not quite twice the length of the carapace in the adult male, but shorter than this in the female and young male. Arm with 3 spines on the anterior border, and 2 on the posterior border—one terminal, the other submedian: a strong spine at inner angle of wrist, the outer angle being rounded and armed with one, or sometimes two, small spines or teeth: hand with 3 spines or tubercles, one being in front of the apex of the wrist-joint, the other two being side by side behind the finger-joint—(the outer of these two is sometimes obsolescent).

Legs unarmed.

Abdomen of male broadly triangular.

An extremely common crab in all the estuaries and backwaters of India, from Karáchi to Mergui. It grows to a large size.

In young specimens the frontal lobes are broad and indistinct, the upper surface of the palm is traversed by two faint but distinct longitudinal costæ, and there may be a transverse granular line across the gastric region.

This is the common edible crab of India.

NEPTUNUS, De Haan, A. Milne Edwards, Miers.

*Neptunus*, De Haan, A. Milne Edwards, Ann. Sci. Nat., Zool., (4) XIV. 1860, p. 226 and Archiv. du Mus. X. 1861, p. 314 (*ubi syn.*)

*Neptunus*, *Achelous*, *Amphitrite*, *Pontus*, De Haan, Faun. Japon. Crust. pp. 7, 8, 9.

*Posidon*, Herklots, Add. Faun. Carcin. Afric. Occ. p. 3.

*Lupa*, *Arenaeus*, *Amphitrite*, Dana, U. S. Expl. Exp. Crust. pt. I. pp. 270, 275, 289.

*Euctenota*, Gerstaecker, Archiv. f. Naturges. XXII. 1856, i. p. 131.

*Neptunus*, *Achelous*, A. Milne Edwards *op. cit.*

*Callinectes*, Stimpson, Ann. Lyc. Nat. Hist. New York, VII. 1860, p. 220.

*Xiphonectes*, A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 157.

*Hellenus*, A. Milne Edwards, Miss. Sci. Mex., Crust. pp. 210, 221.

*Neptunus*, *Xiphonectes*, Miers, Challenger Brachyura, pp. 171, 183.

*Portunus*, M. J. Rathbun, see Proc. Biol. Soc. Washington, June, 1897, pp. 155, 160.

Carapace usually transverse, broad, and depressed or little convex, often with the surface areolated.

Front proper well delimited from the inner supra-orbital angles and cut into from 3 to 6—usually *four*—teeth: its breadth (not including the supra-orbital angles) is from a sixth to a fifth the greatest breadth of the carapace (lateral epibranchial spines not included), and it is often somewhat receding.

Antero-lateral borders oblique, arched, longer than the postero-lateral, cut into 9 regular teeth (including the outer orbital angle) of which the 9th may be enlarged or not.

The orbit usually has 2 fissures or sutures in the upper border, which border is less prominent than the lower border, so that the orbit very often has a dorsal inclination: the lower border has a fissure or suture near the outer angle, and the inner angle is dentiform and usually very prominent. The antennules fold transversely.

The basal antenna-joint is peculiarly short and has its antero-external angle produced to form a lobule or spine extending into the orbit: the flagellum, which is of fair length, stands in the orbital hiatus.

Epistome short or even linear, sometimes prolonged in the middle line to form a spine lying below the inter-antennular septum. Buccal cavern squarish, broader than long, the efferent branchial channels almost always very well defined.

Chelipeds longer, usually much longer, than any of the legs, and massive: arm with spines, both inner and outer angles of wrist spiniform, palm prismatic costate and usually with spines, fingers usually nearly as long as the palm and strongly toothed.

Legs compressed: in the last pair the merus and carpus are short and broad, and the propodite and dactylus are typically foliaceous and paddle-like for swimming.

The abdomen of the male is five-jointed, the 3rd-5th terga being fused: the 1st tergum in both sexes is almost entirely concealed beneath the carapace.

The Indian species of the genus *Neptunus* fall into five groups, or subgenera, which are characterized as follows :—

- I. Carapace very broad, little convex, and having the junction of the posterior with the postero-lateral angles rounded. Front not projecting beyond, or even receding behind, the internal supra-orbital angles: the last spine of the antero-lateral borders enormously larger than any of the others. Orbits of moderate size and having only a slight dorsal inclination. Antero-external angle of basal antenna-joint produced to a spiniform process lying in the orbit. Epistome produced in the middle line to form a very prominent spine: the antero-external angle of the merus of the external maxillipeds rounded, not produced laterally. Hand at least as massive as the arm..... NEPTUNUS.
- II. Carapace moderately broad, little convex, and having the postero-lateral junctions rounded. Front hardly projecting beyond the internal supra-orbital angles, but not receding: the last spine of the antero-lateral borders a good deal the largest. Orbits large, with a very strong dorsal inclination. Antero-external angle of basal antenna-joint forming a blunt lobe-like process. Epistome slightly produced in a spiniform manner: the antero-external angle of the merus of the external maxillipeds strongly produced in a lateral direction. Hand at least as massive as arm ..... AMPHITRITE.
- III. Carapace suborbicular or not very broad, flat, the postero-lateral junctions rounded. Front slightly projecting beyond the internal supra-orbital angles: the last spine of the antero-lateral border either hardly larger or actually smaller than any of the others. Orbits of moderate size and with a moderate dorsal inclination. Antero-external angle of basal antenna-joint forming a lobe-like process. Epistome hardly produced in the middle line: antero-external angle of merus of external maxillipeds strongly produced in a lateral direction. Hand hardly less massive than the arm ..... ACHELOUS.
- IV. Carapace moderately broad, flat or little convex, and having the postero-lateral junctions angular or actually spiniform. Front decidedly prominent beyond the inner supra-orbital angles: the last spine of the antero-lateral borders very much the largest. No free prolongation of the epistome in the middle line. Hand about as massive as arm. [Except in *N. spinipes*, the angle of the basal antenna-joint is a lobe-like process. Except in *N. tuberculosus* and *brockii*, the orbits are large with a very strong dorsal inclination. Except in *N. hastatoides*, the antero-external angle of the

- merus of the external maxillipeds is not produced in a lateral direction] ..... HELLENUS.
- V. Carapace moderately broad, distinctly convex, rounded postero-laterally. Front projecting beyond the inner supra-orbital angles: the last spine of the antero-lateral borders slightly the largest. Orbits large, with strong dorsal inclination. Basal antenna-joint longitudinally grooved on ventral surface. No free prolongation of the epistome in the middle line: no lateral expansion of the antero-external angle of the merus of the external maxillipeds. Hand much slenderer than the arm ..... LUPOCYCLOPORUS.

*Key to the Indian species of the genus Neptunus.*

- I. Hand either more, or but little less, massive than arm:—
- A. Last spine of antero-lateral border much the largest:—
1. Posterior angles of carapace rounded (NEPTUNUS):—
- i. Antero-external angle of merus of external maxillipeds rounded:—
- a. No spine on the posterior border of the arm ..... *N. sanguinolentus.*
- b. A spine at far end of posterior border of arm ..... *N. pelagicus.*
- ii. Antero-external angle of merus of external maxillipeds strongly produced in a lateral direction (AMPHITRITE):—
- a. No spot on dactylus of last pair of legs ..... *N. gladiator.*
- b. A spot on dactylus of last pair of legs: crests of hands and abdomen with a pearly sheen ..... *N. argentatus.*
- c. Spine at inner angle of wrist two-thirds as long as palm ..... *N. petreus.*
2. Posterior angles of carapace square or spiniform (HELLENUS):—
- i. Posterior angles square: front cut into 3 teeth ..... *N. tenuipes.*
- ii. Posterior angle spiniform: front cut into 4 teeth:—
- a. Two distinct spines on posterior border of arm:—
- α. After half of distal border of merus of last pair of legs finely serrulate ..... *N. hastatoides.*
- β. After half of distal border of merus of last pair of legs smooth ..... *N. andersoni.*

- φ. A spine near far end of posterior border of merus of last pair of legs ..... *N. spinipes*.  
 b. A single true spine on posterior border of arm :—  
   π. Middle teeth of front very much smaller and less prominent than the outer : three spines on hand ..... *N. longispinosus*.  
   β. Middle teeth of front nearly as large as, and more prominent than, the outer : two spines on hand ..... *N. tuberculosus*.  
   φ. Teeth of front obsolescent : no spines on hand ..... *N. brockii*.  
 B. Last spine of antero-lateral border either hardly larger or even smaller than any of the others (ACHÆLOUS) :—  
   1. Carapace granular, last spine of antero-lateral border slightly the largest ..... *N. granulatus*.  
   2. Carapace polished, last spine of antero-lateral border slightly smaller than the others ..... *N. orbicularis*.  
 II. Hand slender, much less massive than arm (LUPOCYCLOPORUS) :  
   1. Front cut into four teeth of nearly equal size, of which the middle two are the most prominent ..... *N. whitei*.  
   2. Front cut into four lobes, of which the middle two are much the smaller and are hardly more prominent than the others ..... *N. gracilimanus*.

Dr. J. R. Henderson includes *Neptunus sieboldi*, A. Milne Edwards (Archiv. du Mus. X. 1861, pp. 323, 339, pl. xxxv. fig. 5), which according to de Man is identical with *N. convexus* De Haan, in the Indian Fauna. It appears to belong to the sub-genus *Neptunus*, and is distinguished by the uniformity of size and shape of the frontal teeth, by the small size of the last spine of the antero-lateral border, and by the absence of any spine on the posterior border of the arm.

### 11. *Neptunus sanguinolentus*, (Herbst).

*Cancer pelagicus*, (part), Fabricius, Mant. Ins. I. p. 318, and Ent. Syst. II. 447.

*Cancer sanguinolentus*, Herbst, Krabben, I. ii. 161, pl. viii. figs. 56, 57.

*Portunus sanguinolentus*, Fabricius, Ent. Syst. Suppl. p. 367 : Bosc, Hist. Nat. Crust. I. p. 220 : Latreille, Encyc. Meth. X. p. 190.

*Lupa sanguinolenta*, Desmarest, Dict. Sci. Nat. XXVIII. p. 224, and Consid. Gen. Crust. p. 99 : Milne Edwards, Hist. Nat. Crust. I. 451 and in Cuvier Règne An. pl. x. fig. 1 : Lucas Hist. Nat. Anim. Art. Crust. p. 101 : Dana, U. S. Expl. Exp. Crust. pt. I. p. 271 : Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 38 : Tozzetti, "Magenta" Crust. p. 68.

*Neptunus sanguinolentus*, De Haan, Faun. Japon. Crust. p. 38 : A. Milne Edwards, Archiv. du Mus. X. 1858-1861, pp. 319, 339, and in Maillard's l'île Réunion,

Annexe F. p. 2: Heller, "Novara" Crust. p. 26: Brocchi, Ann. Sci. Nat. (6) II. 1875. Art 2, p. 55, pl. xvi. figs. 83, 84 (*male appendages*): Miers, Cat. New Zealand Crust. p. 26, and Ann. Mag. Nat. Hist. (5) V. 1880, p. 238, and Challenger Brachyura, p. 174: Streets, Bull. U. S. Nat. Mus. VII. 1877, p. 106: Haswell, Cat. Austral. Crust., p. 77: Filhol, Crust. Nouv. Zél., Miss de l'île Campbell, p. 382, F. Muller, Verh. Naturf. Ges. Basel, VIII. 1886, p. 475: de Man, Archiv. f. Naturges. LIII. i. 1887, p. 328, and in Weber's Zool. Ergebn. Niederl. Ost-Ind. II. 1892, p. 285 and Zool. Jahrb., Syst. etc., VIII. 1894-95, p. 556: Cano, Boll. Soc. Nat. Napol. III. 1889, p. 212: Pfeffer, Mitt. Nathist Mus. Hamburg VII. 1889 (1890), No. 8, p. 6 (*female dimorphism*): J. R. Henderson, Tr. Linn. Soc. Zool. (2) V. 1893, p. 368: Ortmann, Zool. Jahrb., Syst. etc., VII. 1893, p. 75, and in Semon's Forschungar. (Jena. Denk VIII) Crust. p. 45.

Carapace very broad, little convex, its length in the middle line half its breadth excluding the great lateral spines, finely granular everywhere in the young but only in the anterior half in the adult, crossed transversely by some slightly-raised granular lines—two on the gastric, one on either branchial region—conspicuously marked posteriorly by three large blood-red spots.

Front cut into four sharp and very distinct teeth—not counting the inner supra-orbital angles—of which the middle two are the less prominent and have projecting between and far beyond them the spine-like process of the epistome. Supra-orbital borders cut by 2 fissures into 3 lobes, the angles of the middle lobe not conspicuous.

Antero-lateral borders very long and oblique, cut into 9 teeth including the outer orbital angle) the last of which is about four times as long as any of the others. The posterior border, which is smooth, forms a common curve with the postero-lateral borders.

Antero-external angle of merus of external maxillipeds not produced.

Chelipeds in the adult male about  $2\frac{3}{4}$  times the length of the carapace, but rather less in the female and young male: the hand is the most massive segment. Arm with 3 or 4 large spines on the anterior (inner) border, but without any on the posterior border. Hand and outer surface of wrist costate, the costæ smooth: both inner and outer angle of wrist strongly spiniform: the palm, which is not, or only slightly, longer than the fingers has two spines dorsally, one being in front of the apex of the wrist-joint, the other just behind the finger-joint.

Legs smooth: a spinule near the far end of the posterior border of the carpus of the first two pairs.

*A large species.*

In the Indian Museum are 60 specimens, from Penang, Nicobars, east and west coasts of the Peninsula, Ceylon, and Karáchi.

12. *Neptunus pelagicus*, Linn.

*Pagurus reidjungan*, Rumph, Amboinsch. Rariteitk. I. p. 11 (which also seems to include *N. sanguinolentus*), pl. vii. fig. R.

*Cancer pelagicus*, Linnæus, Mus. Lud. Ulr. p. 434, and Syst. Nat. (xii. ed.) p. 1042: Forskal, Descr. Anim. p. 89: Fabricius, Ent. Syst. II. p. 447 (part).

*Cancer cedo-nulli*, Herbst, Krabben, II. ii. 157, pl. xxxix.

*Cancer reticulatus*, Herbst, Krabben, III. i. 65, pl. l.

*Portunus pelagicus*, Fabricius, Ent. Syst. Suppl. p. 367: Latreille, Hist. Nat. Crust. VI. 16, and Encycl. Meth. X. p. 188: Savigny, Descr. Egypt. pl. iii. fig. 3 (Andouin, Expl. p. 83).

*Portunus cedo-nulli*, Bosc, Hist. Nat. Crust. I. p. 221.

*Lupa pelagica*, Desmarest, Dict. Sci. Nat. XXVIII. p. 223 and Consid. Gen. Crust. p. 98, pl. vi. fig. 2: Milne Edwards, Hist. Nat. Crust. I. 450: Lucas, Hist. Nat. Anim. Art. Crust. p. 101, pl. vii. fig. 2: Dana, U. S. Expl. Exp. Crust. pt. I. p. 271: Stimpson, Proc. Acad. Nat. Sci. Philad. 1858, p. 38: Heller, SB. AK. Wien, XLIII. 1861, p. 355: Hilgendorf in v. d. Decken's Reisen Ost-Afr. III. i. p. 77: Tozzetti, 'Magenta' Crust. p. 66, pl. v. fig. 3a-b.

*Neptunus pelagicus*, DeHaan, Faun. Jap. Crust. p. 37, pl. ix, x: Krauss, Sudafr. Crust. p. 23: A. Milne Edwards, Archiv. du Mus. X. 1861, pp. 320, 329, and Nouv. Archiv. du Mus. IV. 1868, p. 70, and IX. 1873, p. 156: Heller, Novara Crust. p. 27: Hess, Archiv. f. Naturges. XXXI. 1865, i. pp. 138, 172: Brocchi, Ann. Sci. Nat. (6) II. 1875, Art. 2, p. 52, pl. xv. fig. 74, 75 (male appendages): Miers, Cat. New Zealand Crust. p. 25, and Ann. Mag. Nat. Hist. (4) XVII. 1876, p. 221, and (5) V. 1880, p. 238, and Zool. H.M.S. Alert, pp. 183, 289, and Challenger Brachyura, p. 173: Kossmann, Reise roth Meer. Crust. p. 46: Neumann, Cat. Crust. Heidelb. Mus. p. 24: Hilgendorf, MB. AK. Berl. p. 799: Nauck, Zeits. Wiss. Zool. XXXIV. 1880, p. 62 (gastric teeth): de Man, Notes Leyden Mus. II. 1880, p. 183, and Archiv. f. Naturges. LIII. 1887, i. p. 328, and Journ. Linn. Soc., Zool., XXII. 1888, p. 69, and in Weber's Zool. Ergebn. Niederl. Ost-Ind. II. 1892, p. 284: Haswell, Cat. Austral. Crust. p. 77: Filhol, Crust. Nouv. Zél. p. 381: Cano, Boll. Soc. Nat. Napoli, III. 1889, p. 212: Pfeffer, Mitteil. Nat. Hist. Mus. Hamb. XII. 1889, No. 8, p. 6: A. O. Walker, Journ. Linn. Soc., Zool., XX. 1890, p. 110: J. R. Henderson, Trans. Linn. Soc. Zool., (2) V. 1893, p. 367: Ortmann, Zool. Jahrb., Syst., VII. 1893, p. 74, and in Semon's Forschunger. (Jena. Denk. VIII.) Crust. p. 45.

? *Neptunus armatus*, A. Milne Edwards, Archiv. du Mus. X. 1861, pp. 322, 339, pl. xxxiii. fig. 2: Miers, Zool. H. M. S. Alert, pp. 183, 229: Cano, Boll. Soc. Nat. Napol. III. 1889, p. 212: J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 370: Ortmann, Zool. Jahrb. Syst. VII. 1893-94, p. 75.

*Neptunus trituberculatus*, Miers, Ann. Mag. Nat. Hist., (4) XVII. 1876, p. 221 and (5) V. 1880, p. 238, and Cat. Crust. New Zealand, 1876, p. 25, and Challenger Brachyura, p. 172: Ortmann, Zool. Jahrb. Syst. VII. 1893, p. 74.

Carapace broad, little convex, its length a little more than half its breadth without the great lateral spines, at all ages closely covered with largish miliary granules: two transverse lines on the gastric, one on either branchial region: sometimes two lumps on the cardiac and one on the post-gastric region, these being very variable in size and distinctness.

Front cut into four teeth—not counting the inner angles of the orbit—of which the middle two are small and little prominent, or obsolescent, or even confluent and obsolete: between and far beyond them projects the spine-like process of the epistome. Supra-orbital borders cut by two fissures into three lobes, the outer angle of the middle lobe being usually dentiform.

Antero-lateral and posterior borders and external maxillipeds almost as in the preceding species.

Chelipeds in the adult male more than 3 times, in the female and young male not quite  $2\frac{1}{2}$  times the length of the carapace—the hand the most massive segment. Arm with 3 large spines on the anterior (inner) border and with 1 at the far end of the posterior border. Wrist and hand much as in the preceding species, but the costæ are, for the most part, granular, and the hand carries 3 spines two of which stand side by side behind the finger-joint.

Legs as in *N. sanguinolentus*.

Colours in spirit yellowish, the carapace chelipeds and proximal joints of the last pair of legs having the dorsal surface copiously and coarsely reticulated with bluish and purplish green.

A large species.

In the Indian Museum are 46 specimens from all parts of the coasts of the Indian Seas, from Penang to the Persian Gulf, besides 13 from Japan, Hongkong, Australia and Suez.

### 13. *Neptunus (Amphitrite) gladiator* (Fabr.).

*Portunus gladiator*, Fabricius, Ent. Syst. Suppl. p. 368: Bosc, Hist. Nat. Crust. I. p. 219: Latreille, Hist. Nat. Crust. VI. p. 19, and Encycl. Meth. X. p. 189.

*Cancer menestho*, Herbst, Krabben, III. iii. 34, pl. lv. fig. 3.

*Lupea gladiator*, Milne Edwards, Hist. Nat. Crust. I. 456.

*Amphitrite gladiator*, De Haan, Faun. Jap. Crust. p. 39, pl. i. fig. 5: Haswell, Cat. Austral. Crust. p. 84.

*Neptunus gladiator*, A. Milne Edwards, Archiv. du Mus. X. 1861, pp. 330, 339: Richters in Möbius Meeresf. Maurit. p. 152: Muller Verh. Nat. Ges. Basel, VIII. 1886, p. 475: Miers, Challenger Brachyura, p. 177: de Man, Journ. Linn. Soc., Zool., XXII. 1888, p. 69: J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 367: Ortmann, Zool. Jahrb. Syst. VII. 1893-94, p. 73.

*Amphitrite Haanii*, Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 38.

? *Amphitrite media*, Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 39 (v. A. Milne Edwards, Archiv. du Mus. X. 1861, pp. 331, 339 and Ortmann, Zool. Jahrb. Syst. VII. 1893-94, p. 73).

Carapace depressed, finely submentose, its length about two-thirds its breadth without the great lateral spines, its surface broken by low symmetrically disposed sub-regional elevations the summits aloze of which are granular.



Front cut into four acute teeth (not counting the inner supra-orbital angles) of which the middle two are the smaller and less prominent and have projecting between them the dentiform process of the epistome. Supra-orbital margin cut by two fissures into three lobes, the outer angle of the middle lobe strongly dentiform.

Antero-lateral and posterior borders much as in the preceding species except that the great lateral spines are only about  $2\frac{1}{2}$  times the length of any of the others.

Eyes large, reniform, not concealed to dorsal view by the orbits, which are large and almost entirely dorsal in position.

Antero-external angle of merus of external maxillipeds very strongly produced in a lateral direction.

Chelipeds in the adult male a little over  $2\frac{1}{2}$  times the length of the carapace, somewhat shorter in the female—the hand the most massive segment: granular in places, the granules on the upper surface of the arm and under surface of the hand forming sub-squamiform lines. Arm with 4 spines on the anterior (inner) border and 2 near the far end of the posterior border. Wrist and hand costate, the costæ granular. Both inner and outer angle of wrist strongly spiniform, the former very strongly so. Two spines on the hand, one being just in front of the apex of the wrist-joint, the other being a short distance behind the finger-joint: the carina that forms the outer boundary of the lower surface of the hand is very salient.

Legs, like the arm, tomentose in places, but very strongly so along the anterior (inner) border: no spinule on the posterior border of the carpopodites.

The abdomen in the male has remarkably sinuous lateral borders: the 2nd and 3rd abdominal terga in both sexes are very strongly carinated.

Colours in spirit yellow, often with some red markings on edges of carapace and on fingers and on spines of chelipeds.

A species of medium size, adult males having the carapace about 33 millim. long and about 65 millim. broad including the great lateral spines.

In the Indian Museum are 13 specimens from Ceylon, Madras, Sunderbunds, and Mergui.

#### 14. *Neptunus (Amphitrite) argentatus* (White) A. M. Edw.

[“*Amphitrite argentata*, White List. Crust. Brit. Mus. p. 126.”]

*Neptunus argentatus*, A. Milne Edwards, Archiv. du Mus. X. 1861, pp. 332, 339, pl. xxxi, fig. 4: J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 368.

*Neptunus gladiator*, var. *argentatus*, Miers, Challenger Brachyura, p. 177: Cano, Boll. Soc. Nat. Napoli. III. 1889, p. 214: Ortmann, Zool. Jahrb. Syst., VII. 1893-94, p. 73.

Very like *N. gladiator* but easily distinguished by the following characters :—

(1) the carapace is longer and narrower, its length being three-fourths its breadth without the great lateral spines; and its sub-regional convexities are in much stronger relief and much better defined :

(2) the median frontal teeth are smaller and less prominent, and the outer angle of the middle lobe of the supra-orbital margin is less acute :

(3) the crests of the outer surface of the palm and immobile finger and of the third abdominal segment are not only more salient and trenchant, but also have a curious silvery or coppery pearly sheen :

(4) the chelipeds are shorter; and there is a dark round spot near the tip of the dactylus of the last pair of legs.

It is a very much smaller species; only one of numerous egg-laden females in the Indian Museum has the carapace more than 20 millim. long and 30 millim. broad (including spines). Specimens of *N. gladiator* of this size are obviously immature.

In the Indian Museum are 63 specimens from the Andamans, Mergui (Marine Survey), Arakan coast, Ganjam coast, Ceylon, and Malabar coast. Nearly half the specimens are recorded from depths of 18 to 33 fathoms.

#### 15. *Neptunus (Amphitrite) argentatus* var. *glareosus*.

In this variety the carapace is even narrower and more elongate, its subregional convexities are hardly less salient and well defined than those of *N. tuberculosus*, and its surface is almost free of tomentum. The carina of the 3rd abdominal tergum is about twice as prominent as it is in the typical form, having the shape of a prominent foliaceous lobe. The dorsal surface of the body and chelipeds is profusely speckled.

26 specimens, including egg-laden females, were dredged from a bottom of sand and stoues off the Andamans at 55 fathoms.

#### 16. *Neptunus (Amphitrite) petreus*, n. sp.

This species differs from *N. gladiator*, and approaches *N. spinicarpus* Stimpson, in the enormous development of the spine at the inner angle of the wrist.

It will be sufficient to point out the characters that distinguish it from *N. gladiator*, of which it may prove to be only a variety.

The length of the carapace is nearly  $\frac{3}{4}$  the breadth without the lateral spines. The frontal teeth are blunt and the epistome is not

produced. The last spine of the antero-lateral border is hardly twice the length of any of the others. The costæ of the wrist and hand are low, and the spine at the inner angle of the wrist is about two-thirds the length of the palm.

A single male specimen from the Pedro Shoal north of the Laccadive Islands. The carapace is 12 millim. long and 18 millim. broad including the spines.

17. *Neptunus (Hellenus) hastatoides* (Fabr.) A. M. Edw.

*Portunus hastatoides*, Fabricius, Ent. Syst. Suppl. p. 368.

*Cancer hastatus*, Herbst, Krabben, III. iii. 3, pl. 1v. fig. 1.

*Amphitrite hastatoides*, De Haan, Faun. Jap. Crust. p. 39, pl. i. fig. 3: Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 38.

*Neptunus hastatoides*, A. Milne Edwards, Archiv. du Mus. X. 1861, pp. 332, 338: Miers, Zool. H. M. S. Alert, pp. 183, 229, and Challenger Brachyura, p. 175: J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 368: Ortman, Zool. Jahrb., Syst., VII. 1893-94, p. 74: de Man, Zool. Jahrb., Syst., VIII. 1894-95, p. 557.

Carapace very flat, its length in the middle line is about two-thirds its breadth not counting the great lateral spines, finely subtomentose, its surface symmetrically broken up into low subregional convexities the summits alone of which are granular.

Front slightly prominent beyond the inner supra-orbital angles and cut into four teeth, the middle two of which are very much narrower and acuter than, and are usually as prominent as or even more prominent than, the others: the inconspicuous apical prolongation of the epistome can be seen between, but does not project beyond, the middle teeth. Supra-orbital border cut by two fissures into three lobes, the outer angle of the middle lobe being dentiform.

Antero-lateral borders of moderate length and obliquity, cut into 9 teeth (including the outer angle of the orbit) the last of which is less than three times the length of any of the others in adults, but is longer in the young. The finely-beaded posterior border is practically straight, and forms a sharp or claw-like angle of junction with the postero-lateral borders.

Eyes large and reniform, not concealed by the entirely-dorsal orbits. The antero-lateral angle of the merus of the external maxillipeds is acutely produced in a lateral direction.

Chelipeds in the adult male slightly more than twice the length of the carapace, finely subtomentose, the hands little if at all less massive than the arm. 3 or 4 spines on the anterior (inner) border of the arm, 2 near the far end of the posterior border: hand and upper surface of wrist costate, the costæ granular: inner and outer angles of wrist strongly spiniform: two spines on the hand, one being in front of the apex of the wrist-joint the other just behind the finger-joint.

Legs more or less submentose, quite unarmed, but the after half of the distal border of the merus of the last pair is finely serrulate.

The 3rd segment of the abdomen of both sexes is strongly and sharply carinate: the length of the 6th segment of the male is nearly twice its greatest breadth.

Colours of good fresh spirit specimens, greenish yellow more or less mottled: tip of dactylus of last pair of legs blackish brown.

A small species: egg-laden females have the carapace 22 millim. long and 42 millim. broad including spines.

In the Indian Museum are 137 specimens from the Madras coast, Andamans, G. of Martaban, Penang, and Persian Gulf, besides 6 from Hongkong.

18. *Neptunus (Hellenus) andersoni*, de Man.

*Neptunus andersoni*, de Man, Journ. Linn. Soc., Zool., XXII. 1888, p. 70, pl. iv. figs. 3, 4: J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 368.

This species differs from *N. hastatoides* in the following characters:—

The carapace is more convex, the subregional elevations, instead of being low and ill-defined, are sharply-defined tubercles, and the oblique ridge that traverses either epibranchial region is particularly salient. The front is more prominent beyond the inner supra-orbital angles and the two middle teeth are less prominent than the others. The posterior angles of the carapace are much less acute. The antero-external angle of the merus of the external maxillipeds is less produced in a lateral direction. The chelipeds are shorter, being less than twice the length of the carapace in the male, and the costæ of the wrist and hand are smooth. The 6th segment of the male abdomen is less elongate than in *N. hastatoides*.

The colour of good fresh spirit specimens is biscuit yellow without any mottling or marking.

In the Indian Museum are 4 specimens from the Persian Gulf.

19. *Neptunus (Hellenus) spinipes*, Miers.

*Neptunus spinipes*, Miers, Challenger Brachyura, p. 178, pl. xv. fig. 1.

This species has a strong superficial resemblance to *N. hastatoides*, but is easily distinguished (1) by the more convex carapace (2) by the non-fissured supra-orbital border (3) by the form of the merus of the external maxillipeds which has its antero-external angle rounded *not* produced laterally (4) by the spine on the posterior border of the merus of the last pair of legs, and (5) by the position of the anterior spine of the hand, which is placed a good way back instead of immediately behind the finger-joint.

Carapace appreciably convex, but shaped and sculptured as in *N. hastatoides*. Front very distinctly prominent beyond the inner supra-orbital angles and beyond the epistome, cut into four teeth of which the middle two are somewhat smaller narrower and less prominent than the others.

The supra-orbital border is not fissured, but the orbits otherwise, and the eyes, are as in *N. hastatoides*.

Antero-lateral border cut into 9 teeth (including the outer orbital angle) of which the first 2 or 3 are very small and inconspicuous and the next 5 or 6 small, the last being a spike usually from a third to half the breadth of the carapace proper in length. The posterior border is straight and forms an acutely dentiform angle of junction with the postero-lateral borders.

The merus of the external maxillipeds is narrow and has its antero-external angle simply rounded, not produced laterally.

The chelipeds in the adult male are rather more than  $2\frac{1}{3}$  times the length of the carapace, but are otherwise similar to those of *N. hastatoides*, except that the second spine of the hand is placed a good way behind the finger-joint.

There is a spine near the far end of the posterior border of the merus of the last pair of legs.

The 2nd and 3rd abdominal terga in both sexes are transversely carinate, the carinæ being of no great depth but very elegantly denticulate. The length of the 6th tergum of the male is not much more than its greatest breadth.

A small species: egg-laden females are 6.5 millim. long and 16 millim. broad including spines, but males are nearly twice this size.

In the Indian Museum are 66 specimens, from the Madras coast, Andamans, G. of Martaban, Arakan coast, and Muscat. Most of them come from over 20 fathoms.

The specimen figured by Miers has abnormally short lateral epibranchial spines.

## 20. *Neptunus (Hellenus) longispinosus* (Dana).

*Amphitrite longispinosa*, Dana, Proc. Ac. Nat. Sci. Philad. 1852, p. 84, and U. S. Expl. Exp. Crust. pt. I. p. 277, pl. xvii. figs. 2 a-c.

*Neptunus longispinosus*, A. Milne Edwards, Archiv. du Mus. X. 1861, pp. 337, 339.

*Xiphonectes longispinosus*, Miers, Challenger Brachyura, p. 183: J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 370.

*Amphitrite vigilans*, Dana, Proc. Ac. Nat. Sci. Philad. 1852, p. 84, and U. S. Expl. Exp. Crust. pt. I. p. 278, pl. xvii. figs. 3 a-d.

*Neptunus vigilans*, A. Milne Edwards, Archiv. du Mus. X. 1861, pp. 336, 339.

and in Maillard's l'île Réunion, Annexe F. p. 2: Richters in Möbius, Meeresf. Maurit. p. 152: var. *obtusidentatus*, Miers. Zool. H. M. S. Alert, p. 538, pl. xlviii. fig. A.

*Xiphonectes leptochelae*, A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 159, pl. iv. fig. 1.

Carapace flattish, its length is from  $\frac{2}{3}$  to  $\frac{3}{4}$  its breadth without the spines, its surface is subtomentose and is cut up into well defined sub-regional elevations, the convexities of which are granular.

Front prominent beyond the hardly independent inner supra-orbital angles and beyond the epistome, cut into four usually acute, triangular teeth—the middle two small and receding, the outer ones very large and prominent. Supra-orbital margin cut by 2 fissures.

Antero-lateral borders moderately oblique, armed with a variable number of small and inconspicuous teeth, and ending in a lateral epibranchial spine that is about half the breadth of the carapace in length. The number of teeth, including the outer orbital angle and the lateral spine, varies from 6 in the young to 9 in the adult, though there are adults with less than 9.

The posterior border is nearly straight and makes a dentiform or sub-dentiform angle of junction with the postero-lateral borders.

Orbits dorsal not concealing the large reniform eyes. Antero-external angle of merus of external maxillipeds not produced in a lateral direction.

Chelipeds of male about  $2\frac{1}{2}$  times the length of the carapace, granular, the granules being in places sub-squamiform, the hand as a whole not less massive than the arm: 3 or 4 spines on the anterior (inner) border of the arm and one at the far end of the posterior border: inner and outer angles of wrist spiniform: hand and fingers costate, the costæ granular, there are 3 spines on the hand, one being in front of the apex of the wrist-joint, the other two standing side by side (the inner the larger) in the distal half of the upper surface.

First three pair of legs slender.

2nd and 3rd abdominal terga transversely carinate, the carinæ not being very prominent: the sides of the male abdomen sinuous.

A small species: egg-laden females have the carapace 9 millim. long and 20 millim. broad including the spines, but many males are a good deal larger, and, on the other hand, egg-laden females are occasionally much smaller.

Colours of good fresh spirit specimens yellow, with much brown and green mottling on dorsal surface of carapace, chelipeds and legs.

In the Indian Museum are 81 specimens from the Andamans, Maldives, and Persian Gulf, besides 2 from Mauritius.

For a long time I thought I could recognize three distinct species differing from one another (1) in relative length of carapace, (2) in relative length and in sculpture of chelipeds, especially of the hands, and (3) in the degree of prominence of the inner supra-orbital angle. But after a careful examination of 83 specimens I find that all these differences are inconstant, as Miers has already said.

## 21. *Neptunus (Hellenus) tenuipes*, De Haan.

*Amphitrite tenuipes*, De Haan, Faun. Japon. Crust. p. 39, pl. i. fig. 4: Haswell, Cat. Austral. Crust. p. 83.

*Neptunus tenuipes*, A. Milne Edwards, Archiv. du Mus. X. 1861, pp. 335, 339: Thallwitz, Abh. Zool. Mus. Dresden, 1890-91, No. 3. p. 48: Ortmann, Zool. Jahrb., Syst. VII. 1893, p. 74.

Carapace little convex, its length about  $\frac{2}{3}$  its breadth without the spines, its surface sufficiently tomentose to appear almost smooth, but when denuded it is found to be cut up into well defined sub-regional elevations the convexities alone of which are granular.

Front prominent beyond the inner supra-orbital angles and beyond the epistome, cut into three bluntly triangular teeth, of which the middle one is slightly the smaller and less prominent. Supra-orbital border cut by two-fissures.

Antero-lateral border cut into 9 close-set teeth (including the outer orbital angle) of which the last is about three times as long as any of the others. The posterior border is slightly curved and meets the postero-lateral borders at a well-marked angle, which is sometimes slightly turned up.

Eyes large, reniform, not concealed by the almost completely dorsal orbits. Outer angle of merus of external maxillipeds not produced laterally.

Chelipeds in the adult male about  $2\frac{1}{4}$  times the length of the carapace, the hand being the most massive segment. Arm with 3 spines on the anterior (inner) border and 1 at the far end of the outer border: both inner and outer angle of wrist spiniform, the inner most conspicuously so. Hand costate, the costæ serrulate; armed with 2 spines, one being in front of the apex of the wrist-joint, the other slightly behind the finger-joint.

First 3 pair of legs slender, the first pair hardly shorter than the chelipeds.

Abdomen of male sinuous.

In the Indian Museum are 14 specimens from the Andamans.

## 22. *Neptunus (Hellenus) tuberculatus*, A. M. Edw.

*Neptunus tuberculatus*, A. Milne Edwards, Archiv. du Mus. X. 1861, pp. 333, 339,

pl. xxxi. fig. 5 : Miers, Challenger Brachyura, p. 176 : J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 369.

Carapace flat, its length in the middle line between  $\frac{3}{4}$  and  $\frac{1}{2}$  its breadth without the great lateral spines, its surface rough, granular, and symmetrically puckered or tubercled.

Front prominent beyond the inner supra-orbital angles and beyond the epistome, cut into four bluntly triangular teeth of nearly equal size, of which the middle two are the more prominent. Supra-orbital margin cut by two fissures.

Antero-lateral borders rather long, moderately oblique, cut into 9 teeth (including the outer orbital angle) the last of which is about 3 times longer than any of the others : the teeth are often rather irregular. Posterior border nearly straight and forming a dentiform angle of junction with the postero-lateral borders.

The orbits are not completely dorsal. The merus of the external maxillipeds is elongate, but has not the antero-external angle produced laterally.

Chelipeds of the male a little over twice the length of the carapace, granular, the hand the most massive joint. 3, occasionally 4, teeth on the anterior (inner) border of the arm, and 1 at the far end of the posterior border. Hand and upper surface of wrist costate, the costæ granular : both inner and outer angle of wrist spiniform : two spinules, which are often blunt and inconspicuous, on the hand in the usual position : fingers a good deal shorter than the palm.

Legs unarmed : sternum granular.

A small species ; ovigerous females have the carapace 11 millim. long and 21 millim. broad including spines.

Colours of good fresh spirit specimens yellow, profusely mottled and speckled with brown green and purple.

In the Indian Museum are 43 specimens from the Andamans, off Ceylon 28 fathoms, and the Persian Gulf.

### 23. *Neptunus (Hellenus) Brockii*, de Man.

*Neptunus brockii*, de Man, Archiv. f. Naturges. LIII. 1887, i. p. 328, pl. xiii. fig. 4.

Closely resembles *N. tuberculosus*, but is distinguished by the following characters, specimens of the same size and sex being compared :—

(1) the front is not cut into teeth, but forms a simple lamina that projects slightly beyond the inner supra-orbital angles ;

(2) the surface of the carapace is cut up into low granular sub-regional elevations, but the tubercles characteristic of *N. tuberculosus* are absent :



(3) there are no spines on the hand. [But there are specimens of *N. tuberculosus* in which the spines of the hand are blunt and inconspicuous].

In the Indian Museum are two males from the Andamans. After comparing these with 43 specimens, of both sexes and all sizes, of *N. tuberculosus* I think they should be kept distinct.

#### 24. *Neptunus (Lupocyclusporus) Whitei.*

*Achelous Whitei*, A. Milne Edwards, Archiv. u. Mus. X. 1861, pp. 343, 347, pl. xxxi. fig. 6: A. O. Walker, Journ. Linn. Soc., Zool., XX. 1886-90, p. 110: J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 371.

*Neptunus Whitei*, Miers, Challenger Brachyura, p. 171.

Carapace fairly convex, its length about  $\frac{2}{3}$  its breadth without the spines, its surface finely pilose, but not sufficiently so to conceal a characteristic series of transverse finely-beaded ridges, of which there are 3 on the gastric, 3 on either branchial region, and one on the cardiac.

The front, which is prominent beyond the bluntly dentiform inner supra-orbital angles and beyond the epistome, is cut into four very definite teeth of nearly equal size, of which the middle two are slightly the more prominent. Supra-orbital border cut by two fissures.

Antero-lateral borders moderately oblique, cut into nine regular teeth (including the outer orbital angle) of which the last is barely twice the length of the others in the adult, though in the young it is a good deal longer. Posterior border finely beaded, and forming a common curve with the postero-lateral borders.

Orbits large, almost entirely dorsal in position, not concealing the large reniform eyes from dorsal view.

Chelipeds nearly 3 times the length of the carapace in the adult male, more or less covered with squamiform granules, the wrist and hand much slenderer than the arm. 4 to 6 spines on the anterior border of the arm; 2 on the posterior border, one being terminal the other submedian. Hand and upper surface of wrist costate, the costæ granular: both inner and outer angle of wrist spiniform: at least 3 spines on the hand, one being in front of the apex of the wrist-joint and two side by side some distance behind the finger-joint. Fingers slender, compressed, ending in long needle-like points, the tips being slightly but very characteristically bent outwards; otherwise the dactylus is nearly straight and the immobile finger gently upcurved.

Legs, like the chelipeds, more or less pubescent: there is a spine near the far end of the posterior border of the merus of the last pair.

Abdomen of male pointed: in both sexes the 2nd and 3rd abdominal terga are transversely, but not very strongly, carinate.

The largest specimen (male) in the Indian Museum has the carapace 24 millim. long and 44 millim. broad including the spines, but there are numerous egg-laden females that are much smaller than this.

In the Indian Museum are 33 specimens, from the Madras coast and the Andamans, besides one of the Challenger duplicates from New-Guinea.

25. ? *Neptunus (Lupocycloporus) gracilimanus*, (Stimpson).

? *Amphitrite gracilimanus*, Stimpson, Proc. Acad. Nat. Sci. Philad. 1858, p. 38.

? *Neptunus gracilimanus*, A. Milne Edwards, Archiv. du Mus. X. 1861, pp. 336, 339.

This species, if my identification be correct, though much like *N. whitei*, is easily distinguished by the following difference:—

(1) the transverse beaded ridges of the carapace are much less distinct and are less numerous: they are six in number, the anterior gastric one being absent: the carapace also is decidedly more convex:

(2) the shape of the front is entirely different, for instead of being cut into four subacute teeth of nearly equal size, it is cut into four lobes of which the outer ones are broad and shallow while the middle two are narrow and dentiform: the inner supra-orbital angles also are much blunter:

(3) the last spine of the antero-lateral border is always in adults more than twice the length of any of the others:

(4) both the spines on the posterior border of the arm are near the far end of that border:

(5) the fingers are incurved, and the bending outwards at tip is inappreciable:

(6) it is a much smaller species: the largest egg-laden female has the carapace 11 millim. long and 21 millim. broad including the spines, and there are numerous egg-laden females much smaller than this.

The differences are constant throughout the whole series of specimens of both sexes.

In the Indian Museum are 45 specimens from the Andamans, G. of Martaban, Arakan coast, and from the east coast of the Peninsula at 15–35 fms.

26. *Neptunus (Achelous) granulatus* (Edw.) A. M. Edw.

*Lupea granulata*, Milne Edwards, Hist. Nat. Crust. I. 454.

*Amphitrite gladiator*, De Haan, Faun. Jap. Crust. p. 65, pl. xviii. fig. 1.

*Amphitrite speciosa*, Dana, Proc. Ac. Nat. Sci. Philad. 1852, p. 84, and U. S. Expl. Exp., Crust. pt. I. p. 276, pl. xvii. fig. 1.

*Achelous granulatus*, A. Milne Edwards, Archiv. du Mus. X. 1861, pp. 344, 347, and in Maillard's île Réunion, Annexe F. p. 2, and Nouv. Archiv. du Mus. IV.

1868, p. 70 and IX. 1873, p. 161 : Streets, Bull. U. S. Nat. Mus. VII. 1877. p. 109 : Miers, Phil. Trans. Roy. Soc. Vol. 168, 1879, p. 488, and Zool. H. M. S. Alert, pp. 230, 538 : Richters in Möbius Meeresf. Maurit. p. 152 : Muller, Verh. Nat. Ges. Basel VIII. 1886, p. 475 : de Man, Archiv. f. Naturges. LIII. 1887, i. p. 331 : Cano. Boll. Soc. Nat. Napol. III. 1889, p. 214 : J. R. Henderson, Trans. Linn. Soc. Zool. (2) V. 1893, p. 371.

*Neptunus (Achelous) granulatus*, Miers, Challenger Brachyura, p. 180 : Thallwitz, Abh. Zool. Mus. Dresden, 1890-91, No. 3, p. 48 : Ortmann, Zool. Jahrb. Syst. VII. 1893-94, p. 72, and in Semon's Zool. Forschunger. (Jena. Denk. VIII.) Crust. p. 45 : de Man, Zool. Jahrb. Syst. VIII. 1894-95 p. 558.

Carapace depressed, a little over three-quarters as long as broad, finely subtomentose, its surface cut up into well-defined sub-regional elevations the convexities of which are granular.

Front slightly receding, slightly prominent beyond the blunt inner supra-orbital angles and beyond the epistome, cut into four lobes (not counting the inner supra-orbital angles) of which the middle two are the smaller and less prominent and are often almost coalescent. Supra-orbital border with two distinct fissures.

Antero-lateral borders very slightly oblique, cut into 9 teeth (including the outer orbital angle) of which the last is but little bigger than any of the others which it quite resembles in shape. The posterior border forms a common curve with the postero-lateral borders.

Orbits not completely dorsal : eyes not very large. Antero-external angle of merus of external maxillipeds considerably produced in a lateral direction.

Chelipeds in the male about  $2\frac{1}{2}$  times the length of the carapace, more or less granular, the hand not or little less massive than the arm. Arm with 4 or 5 spines on the anterior border, and with 2 on the posterior border—one submedian the other subterminal : outer border of wrist subcarinate up to a terminal spinule, inner angle of wrist strongly spiniform : hand costate, with a blunt spinule in front of the apex of the wrist-joint and a sharp spine some distance behind the finger-joint.

First three pair of legs rather slender.

Third abdominal tergum in both sexes strongly and sharply carinate.

Colours of good fresh spirit specimens pale yellow, the dorsal surface of the carapace and chelipeds profusely mottled and speckled with grey and dark red.

A small species : egg-laden females have the carapace 12 millim. long and 15 millim. in total breadth, but adult males are half again as big.

In the Indian Museum are 140 specimens from the Andamans and Nicobars, Persian Gulf, Mergui, Ceylon, and Malabar coast, (besides 3 from Mauritius and 2 from Upolu).

27. *Neptunus (Achelous) orbicularis*, Richters.

*Achelous orbicularis*, Richters in Möbius Meeresf. Maurit. p. 153, pl. xvi. figs. 14, 15: J. B. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 371.

Differs from *Neptunus (Achelous) granulatus* in the following characters:—

(1) the carapace is extremely thin and depressed, is perfectly smooth—except for faint marginal depressions—and bare, and is sub-circular in shape, its length being  $\frac{4}{5}$  its breadth:

(2) the outer fissure of the supra-orbital margin is obsolete, and the inner fissure is represented by a closed suture:

(3) the antero-lateral borders are cut into 9 teeth which gradually decrease in size from before backwards:

(4) the chelipeds in the male are about twice the length of the carapace, their surface is non-granular, and the posterior border of the arm is more expanded than in *N. granulatus*.

In the Indian Museum are 6 specimens from the Pedro Shoal (Laccadives) and 2, including an egg-laden female, from the Andamans.

## CHARYBDIS, De Haan (GONIOSOMA, A. Milne Edwards).

*Charybdis* and *Oceanus*, De Haan, Faun. Japon. Crust. pp. 10, 9.

*Goniosoma*, A. Milne Edwards, Ann. Sci. Nat., Zool., (4) XIV. 1860, p. 263, and Archiv. du Mus. X. 1861, p. 367: Miers, Challenger Brachyura, p. 189.

*Charybdis*, M. J. Rathbun, Proc. Biol. Soc. Washington, XI. 1897, p. 161.

Carapace hexagonal, moderately broad, depressed or little convex, usually with transverse granular ridges at any rate in its anterior half.

Front proper (not including the inner supra-orbital angles from which it is distinctly separated) usually between a fourth and a third the greatest breadth of the carapace, cut into six lobes or teeth (exclusive of the supra-orbital angles).

Antero-lateral borders oblique, moderately arched, longer than the postero-lateral, cut into from 5 to 7—usually six—teeth including the outer orbital angles.

Upper border of orbit with two notches or fissures; there is a gap in the lower border, and the inner angle of this border is usually dentiform and moderately prominent. The antennules fold transversely.

Basal antenna-joint short and broad; its outer angle forms a lobe which usually fills the orbital hiatus and meets the front, excluding the flagellum from the hiatus.

Epistome sufficiently long: buccal cavern squarish, broader than long: the efferent branchial canals usually well defined.

Chelipeds massive, longer than any of the legs, usually a little unequal: arm with spines; the inner angle of the wrist strongly spiniform, the outer angle usually armed with spinules; palm prismatic or tumid, generally with costæ and some definitely placed spines; fingers strong, usually about as long as palm, strongly toothed.

Legs compressed: in the last pair the merus and carpus are shortened and broadened (the merus usually having a spine at the far end of the posterior border) and the propodite and dactylus typically foliaceous for swimming.

The abdomen is as in *Neptunus*.

Although the name *Charybdis* has the priority, and although I cannot admit that anything short of absolute identity—letter for letter—justifies any charge of “preoccupation,” I regret to discard a name that, like *Goniosoma*, has been in use without any shadow of misunderstanding, for nearly 40 years.

I do so only because I believe that *Goniosoma*, if the name be accepted, might with perfect propriety be merged again in *Thalamita*, and because, in any case, the name *Goniosoma* may conveniently be used for a subgenus.

I agree with Ortmann that *Thalamonyx* may quite reasonably be regarded as a subgenus of *Charybdis*, but for mere convenience I should prefer to subdivide the latter genus into three sections, or subgenera, characterized as follows:—

- I. The lobule at the external angle of the basal antenna-joint joins the front and completely excludes the flagellum from the orbital hiatus. The posterior angles of the carapace may be accented or not, but the line that bounds the dorsum of the carapace posteriorly forms a curve with the postero-lateral borders. The four median teeth of the front are not very dissimilar from the two outermost on either side. No spine on the posterior border of the arm..... GONIOSOMA.
- II. The lobule at the external angle of the basal antenna-joint is as in *Goniosoma*; but the posterior border of the dorsum of the carapace is straight and forms a well-marked dog's-eared angle of junction with the postero-lateral borders. The four median frontal teeth are broad and truncated. A spine at the end of the posterior border of the arm..... GONIOHELLENUS.
- III. The lobule at the external angle of the basal antenna-joint does not nearly touch the front, so that the flagellum stands in the upper part of the orbital hiatus. The posterior border of the dorsum of the carapace is straight and forms either an angular junction, or a curve, with the postero-lateral borders. The four

median frontal teeth are larger and broader than the two outermost pairs. A spine at the end of the posterior border of the arm may be present, or not..... GONIONEPTUNUS.

*Key to the Indian species of the genus Charybdis (= Goniosoma.)*

I. The antennal flagellum is completely excluded from the orbital hiatus: the ridge that bounds the dorsum of the carapace posteriorly forms a curve with the postero-lateral borders: no spine on posterior border of arm (*Goniosoma*):—

A. No distinct transverse ridges on the carapace behind the level of the last spine of the antero-lateral borders:—

1. Not more than three large spines on the anterior border of the arm: the orbits have no decided dorsal inclination and their major diameter is never more than one-third the width of the interorbital space:—

a. First spine of antero-lateral border anteriorly truncated and notched: sixth abdominal tergum of male with curved and gradually convergent sides .....

*G. cruciferum.*

b. First spine of antero-lateral border obliquely truncated with the inner angle acute: sixth abdominal tergum of male with curved and gradually-convergent sides: epi-branchial regions extremely tumid dorsally ....

*G. Rivers-Andersoni.*

c. First spine of antero-lateral border acute: the sides of the sixth abdominal tergum of male parallel or slightly divergent in two-thirds or more of their extent:—

i. An acute spine on the posterior border of carpus of last pair of legs .....

*G. merguense.*

ii. A sharply dentiform lobule at the outer end of the lower border of the orbit .....

*G. quadrimaculatum.*

iii. The major diameter of the true orbital cavity is barely a fourth the width of the inter-orbital space .....

*G. annulatum.*

2. Four or more large spines on the anterior border of the arm: the orbits have a strong dorsal inclination and their major

diameter is nearly half the width of the interorbital space: first tooth of antero-lateral border anteriorly truncated and notched .....

*G. miles.*

B. A transverse ridge on the cardiac region, as well as one or two in the posterior half of either branchial region:—

1. Two additional ridges in the posterior half of either branchial region; all the spines of the antero-lateral border well developed:—

a. Carapace moderately broad: first spine of antero-lateral border truncated, the last not enlarged: orbits without dorsal inclination: chelipeds strongly granular and nodular .....

*G. natator.*

b. Carapace very broad: last spine of the antero-lateral border twice as long as any of the others: orbits with strong dorsal inclination: a stout tooth on the lobule of the basal antenna-joint .....

*G. variegatum.*

2. One additional ridge on either branchial region: second spine of antero-lateral border rudimentary .....

*G. orientale.*

C. A transverse ridge on the cardiac region, but none on the posterior half of the branchial region:—

1. Carapace flat: 3 spines on anterior border of arm, 5 on upper surface of hand: sides of 6th abdominal tergum of male curved and gradually convergent .....

*G. affine.*

2. Carapace convex: 2 (hardly ever 3) spines on anterior border of arm:—

a. Carapace about two-thirds as long as broad: 3 spines on the hand: sides of 6th abdominal tergum of male parallel for half their extent .....

*G. callianassa.*

b. Carapace about four-fifths as long as broad: 2 spines on the hand: sides of 6th abdominal tergum of male curved: the two middle frontal teeth remarkably prominent .....

*G. rostratum.*

II. Antennal flagellum completely excluded from orbital hiatus: posterior border of dorsum of carapace straight and forming a dog's-eared angular junction with the postero-lateral borders: the posterior border of the arm ends in a spine (*Goni hellenus*):—

A. Last spine of the antero-lateral border smaller than any of the others .....

*G. ornatus.*

- B. Last spine of the antero-lateral border far larger than any of the others ..... *G. hoplites*.
- III. The lobular process of the basal antenna-joint does not nearly touch the front, so that the flagellum stands in the upper part of the orbital hiatus (*Gonioneptunus*):—
- A. Posterior border of dorsum of carapace forming an angular junction with the postero-lateral borders: the posterior border of the arm ends in a spine:—
1. Transverse ridges of carapace faint: a large red impermanent spot on either branchial region ..... *G. truncatus*.
  2. Transverse ridges of carapace prominent: a persistent small dark brown spot on either branchial region ..... *G. binaculatus*.
- B. Posterior border of dorsum of carapace forming a curve with the postero-lateral borders: no spine on the posterior border of the arm: carapace little transverse, the extent of the fronto-orbital border nearly equal to the greatest breadth of the carapace ..... *G. investigatoris*.

[Besides the species mentioned in the above Key, other two, which I have not seen, are included in the Indian Fauna by other authors. They are *G. erythroductylum* (Lamk.) and *G. sexdentatum* (Herbst) A. M. E.

*G. erythroductylum* is recognized, according to A. Milne Edwards, by having seven teeth, of which the second and fourth are rudimentary, on the antero-lateral borders.

*G. sexdentatum*, A. Milne Edwards, if not of Herbst, is very probably the same as de Man's *G. merguiese*.]

## 28. *Charybdis* (*Goniosoma*) *crucifera*, (Fabr.) A. M. Edw.

Rumph, Amboinsche Rariteitk. pl. VI. fig. P.

*Cancer sexdentatus*, Herbst, Krabben pl. viii. fig. 53 (1790).

*Cancer cruciatus*, Herbst, Krabben pl. II. V. 155, pl. xxxviii. fig. 1 (1794.)

*Portunus crucifer*, Fabricius, Ent. Syst. Snppl. p. 364 (1798); Bosc, Hist. Nat. Crust. I. p. 218; Latreille, Hist. Nat. Crust. VI. p. 14 and Encycl. Meth. X. p. 191.

*Thalamita crucifera*, Milne Edwards, Hist. Nat. Crust. I. 462; Lucas, Hist. Nat.

Anim. Art. Crust. p. 104; Haswell, Cat. Austral. Crust. p. 81.

*Oceanus crucifer*, De Haan, Faun. Japon. Crust. p. 40.

*Charybdis crucifera*, Dana, U. S. Expl. Exp. Crust. pt. I. p. 286, pl. xvii. fig.

11 a-c; Stimpson, Proc. Ac. Nat. Sci. Philad. 1853, p. 39.

*Goniosoma cruciferum*, A. Milne Edwards, Archiv. da Mus. X. 1861, pp. 371.

385; Tozzetti, "Magenta" Crust. p. 82, pl. vi. fig. 2 a-g; Nauck, Zeits. Wiss.

Zool. XXXIV. 1880, p. 61, pl. i. fig. 27. (*gastric teeth*); Muller, Ver. Ges. Nat.

Basel, VIII. 1886, p. 475; Miers, "Challenger" Brachyura p. 191; de Man,

Archiv. f. Naturges. LIII. 1887, l. p. 334, and Journ. Linn. Soc. Zool., XXII. 1887,



1888, p. 79, pl. v. fig. i, and Zool. Jahrb., Syst., VIII. 1895, p. 559: Cano, Boll. Soc. Nat. Napol. III. 1889, p. 218: Walker, Journ. Linn. Soc., Zool., XX. 1886-90, p. 110: Ortmann, Zool. Jahrb., Syst., VII. 1893-94, p. 81: Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 374.

Carapace not distinctly pilose, about two-thirds as long as broad, slightly convex, nearly smooth to the naked eye, the regions ill-defined. A finely granular curved line—broken on the gastric region—traverses it between the last spines of either antero-lateral border, and two similar lines—the anterior widely broken in the middle—cross the anterior part of the gastric region: these are the only ridges on the carapace, and they become faint with age.

The front is rather deeply cut into six prominent regular blunt-pointed teeth, *not* including the inner supra-orbital angles, none of which project much beyond the others.

The antero-lateral borders are cut into six teeth including the outer orbital angles, of which the first is truncated and notched or bifid, the last is almost spine-like but is little more salient than the others, while the other four are broad anteriorly-acuminate lobes.

The posterior border of the dorsal surface of the carapace forms a curve with the postero-lateral borders.

The orbits have but little dorsal inclination: the major diameter of their cavity is a third the width of the inter-orbital space: neither the inner angle nor the lobule at the outer end of their lower border are dentiform, though the latter lobule is well defined.

The lobule at the antero-external angle of the basal antenna-joint has a ridge, but not a tooth.

The chelipeds are nearly  $2\frac{1}{2}$  times the length of the carapace (in the male) and except for definitely placed costæ and spines are smooth: the hands are a little unequal in size. The arm has three enlarged spines on the anterior (inner) border and a spinule at the far end of the inferior border, but the posterior border is unarmed. The wrist has the inner angle strongly spiniform and has three spinules and some smooth ridges on the outer surface. The hands are tumid but not inflated: they are 5-costate and have  $\frac{1}{2}$  spines on the upper surface. In both hands the fingers, which are strongly toothed, are as long as their palm.

In the last pair of legs the merus is about three-fourths as long as broad and has a spine at the far end of the posterior border; the carpus is unarmed, and there are one or two inconspicuous denticles near the far end of the posterior border of the propodite.

The abdomen in both sexes has the 2nd and 3rd terga bluntly carinate: in the male the 6th tergum is much broader than long and has curved and gradually convergent sides.

In spirit the gastric region is purplish brown with a large yellow cross.

Size large: good specimens in the Indian Museum have the carapace 65 millim. in extreme length and 95 millim. in extreme breadth.

29. *Charybdis (Goniosoma) Rivers-Andersoni*, n. sp.

Very closely related to *C. crucifera*, from which it only differs in coloration, in having the epibranchial regions most remarkably swollen above the general dorsal surface of the carapace, in having the frontal teeth very acute, the first tooth of the antero-lateral border not emarginate, and the transverse ridges of the carapace even more obscure.

Carapace perfectly free from pubescence, smooth and polished; its length is a little more than two-thirds its breadth; the gastric region is slightly tumid and the epibranchial regions are very strongly tumid above the rest of its surface. A fine and very faint strongly-arched line crosses the carapace between the last spine of either antero-lateral border, and a still fainter one crosses the gastric region anteriorly: these are the only lines on the carapace and are as faint in the young as in the adult.

Front cut into 8 acute teeth—including the inner supra-orbital angles—arranged in four distinct pairs, the outer pair on either side being almost spine-like.

Antero-lateral borders quite like those of *C. crucifera*, except that the first tooth is obliquely truncated with the inner angle very acute.

Posterior border curved as in *C. crucifera*.

Inner angle of lower border acutely dentiform: the orbits otherwise as in *C. crucifera*.

Chelipeds exactly as in *C. crucifera* except that the hands are less inclined to be tumid.

Last pair of legs as in *C. crucifera* except that the merus is hardly two-thirds as broad as long.

Abdomen in both sexes as in *C. crucifera*.

Colours in spirit: salmon-red, the frontal and antero-lateral borders and the boundary between the branchial and hepatic regions with numerous large creamy spots; four similar spots in a square on the gastric region and a very large one on either branchial region near the middle of the postero-lateral border; fingers blood-red in their distal half, the extreme tips milk-white.

In the Indian Museum are 9 specimens from off the Konkan coast, 56-58 fms., on a bottom of fine sand. The carapace of the largest specimen is 50 millim. in length and 78 millim. in extreme breadth.

30. *Charybdis (Goniosoma) quadrimaculata*, A. M. Edw.

*Goniosoma quadrimaculatum*, A. Milne Edwards, Archiv. du Mus. X. 1861, pp. 375, 385, pl. xxxiv. fig. 3 : Ortmann. Zool. Jahrb., Syst., VII. 1893, p. 82.

*Goniosoma quadrimaculatum*, A. M. Edw. *Portunus lucifer* Fabr., de Man, Journ. Linn. Soc., Zool. XXII. 1887-88, p. 83 footnote.

*Goniosoma luciferum*, J. R. Henderson, Trans. Linn. Soc. Zool., (2) V. 1893, p. 374.

Differs from *C. crucifera* in the following particulars:—

(1) the carapace though in sculpture of surface similar, is very much broader, its length being much less than two-thirds its breadth :

(2) the frontal teeth are deeper cut and those of the second pair slope outwards rather more :

(3) the teeth of the antero-lateral borders are regular and are claw-shaped, instead of being broad anteriorly-acuminate lobes ; the first is acute and except in its smaller size is similar to the next four, and the last is more spine-like and more prominent :

(4) the orbits are smaller, their diameter being only two-sevenths the width of the inter-orbital space ; *both the inner angle and the lobule at the outer end of the lower border are acutely dentiform* :

(5) the chelipeds in the male are not very much more than twice the length of the carapace ; the hand is 6-costate and the costæ are commonly milled in their proximal half, and there are 5 spines on the upper surface of the hand ; the fingers of the larger cheliped are shorter than the palm :

(6) in the last pair of legs the merus is nearly twice as long as broad, and the posterior border of the propodite is strongly serrated throughout :

(7) the 6th tergum of the male abdomen has its sides parallel or even slightly divergent in at least two-thirds of its extent :

Colours in spirit yellowish brown with 2 large white spots on either branchial region.

In the Indian Museum are 20 specimens from all parts of the coast of the peninsula : the carapace of the largest specimen is 60 millim. long and 98 millim. in extreme breadth.

31. *Charybdis (Goniosoma) annulata* (Fabr.) A. M. Edw.

*Portunus annulatus*, Fabricius, Ent. Syst. Suppl. p. 364 (sec. A. Milne Edwards.).

?? *Cancer fasciatus*, Herbst Krabben, III. i. 62, pl. xlix. fig. 5. (sec. A. M. Edw.).

? *Cancer sexdentatus*, Herbst, Krabben, pl. vii. fig. 52.

*Portunus annulatus*, Latreille, Hist. Nat. Crust. VI. p. 15 (sec. A. Milne Edwards.).

*Thalassidroma annulata*, Milne Edwards, Hist. Nat. Crust. I. 463 (sec. A. M. Edw.).

*Goniosoma annulatum* (Fabr.), A. Milne Edwards, Archiv. du Mus. X. 1861, pp. 374, 385 : Miers, Ann. Mag. Nat. Hist. (5) V. 1880, p. 238 : de Man, Notes Leyden

Mus. V. 1883, p. 151 and Zool. Jahrb., Syst., VIII. 1894-95, p. 561 : Ortmann, Zool. Jahrb., Syst., VII. 1893-94, p. 82 : J. R. Henderson, Trans. Linn. Soc. Zool., (2) V. 1893, p. 375.

*Goniosoma orientale* Heller (nec Dana), "Novara" Crust. p. 29, pl. iii. fig. 3 (sec. de Man).

Differs from *C. crucifera* in the following particulars :—

(1) the carapace is more convex, and the transverse lines are even fainter, especially on the gastric region :

(2) the frontal teeth are deeper-cut and sharper (in adults) :

(3) the teeth of the antero-lateral borders are regular ; the first is small and acute, the second is not much larger than the first, and the last (in adults) is smaller than any of the three immediately in front of it :

(4) the major diameter of the orbit is only a fourth the width of the inter-orbital space : the inner angle of the lower border of the orbit is dentiform and strongly salient, and the lobule at the outer end of this border is ill-defined :

(5) the chelipeds are not much more than twice the length of the carapace (in the male) ; the hand has 5 spines on the upper surface, but two of them—those immediately behind the finger-joint—are tubercles rather than spines ; the fingers of the larger cheliped are as long as the palm, those of the smaller cheliped are longer than the palm :

(6) in the last pair of legs the merus is nearly twice as long as broad and the posterior border of the propodite is serrated in a large part of its extent :

(7) the 6th abdominal tergum of the male is as long as or nearly as long as broad and has its sides parallel in about three-fourths of their extent.

From *Charybdis quadrimaculata* this species is distinguished by the narrower carapace, by the smaller orbits and the different form of the lower orbital border, and by the greater length of the 6th tergum of the male abdomen.

In the Indian Museum are 7 specimens from Karachi and 1 from Bimlipatam, besides 1 from Penang. The carapace of the largest specimen is 48 millim. long and 70 millim. in extreme breadth.

But for high contrary authority, I should consider this species to be identical with the *Cancer sexdentatus* of Herbst's pl. vii. fig. 52.

### 32. *Charybdis* (*Goniosoma*) *merguiensis*, de Man.

*Goniosoma merguiense*, de Man, Journ. Linn. Soc., Zool., XXII. 1887-88, p. 82, pl. v. fig. 3, 4, and Zool. Jahrb., Syst., 1894-95 p. 560.

*Goniosoma Helleri*, Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 375.

Very closely resembles *C. quadrimaculata*, but may be distinguished from that species by the following characters:—

- (1) the length of the carapace is two-thirds the breadth:
- (2) the frontal teeth, in the adult are more acute:
- (3) the little lobule at the outer end of the lower border of the orbit is not dentiform:
- (4) there is an acute spine on the posterior border of the carpus of the last pair of legs (as well as the usual one on the merus):
- (5) the 6th abdominal tergum of the male is, like that of *C. annulata*, as long as broad, or nearly so, with the sides parallel or slightly divergent in about three-fourths of their extent.

For the rest, this species differs from *C. crucifera* in the same particulars as *C. quadrimaculata* does, though the last spine of the antero-lateral border is often more prominent than in *C. quadrimaculata*.

In the Indian Museum are specimens, 22 in number from Mergui, Andamans, Karachi and the Persian Gulf—besides 1 from Singapore 2 from Hongkong. The largest has the carapace 46 millim. long and 69 millim. in extreme breadth.

But for high contrary authority I should have felt inclined to refer this species to the *Cancer fasciatus* of Herbst (Krabben III. i. 62, pl. xlix. fig. 5).

### 33. *Charybdis (Goniosoma) affinis*, Dana.

*Charybdis affinis*, Dana, Proc. Ac. Nat. Sci. Philad. 1852, p. 85, and U. S. Expl. Exp. Crust. pt. I. p. 286, pl. xvii. figs. 12 a-c.

*Goniosoma affine*, A. Milne Edwards, Archiv. du Mus. X. 1861, pp. 384, 385: de Man, Journ. Linn. Soc., Zool. XXII. 1887-88, p. 80, pl. V. fig. 2. and Zool. Jahrb., Syst., VIII. 1894-95, p. 559: J. R. Henderson, Trans. Linn. Soc., Zool. (2) V. 1893, p. 374.

Differs from *C. crucifera* in the following particulars:—

- (1) the carapace is flatter, its transverse ridges are much more distinct and there is an additional one across the cardiac region, and the regions are better defined:

- (2) the frontal teeth are more acute and are not so parallel:

- (3) the first tooth of the antero-lateral border though distinctly emarginate anteriorly has its inner angle acute, and the last tooth is conspicuously larger and more prominent than the last but one, the other teeth are more regularly cut and the antero-lateral border as a whole is less oblique:

- (4) the inner angle of the lower border of the orbit is distinctly dentiform:

- (5) the chelipeds are only about twice the length of the carapace in the male: the hands are 6 or 7-costate and have 5 spines on the

upper surface, the palms are more swollen (in the adult) and in the smaller cheliped the fingers are decidedly longer than the palm :

(6) the surface of the carapace and chelipeds is much more pubescent, and the size is much smaller.

In the Indian Museum there are 6 specimens, from Mergui, Akyab, and the Orissa coast: the carapace of the largest is 32 millim. long and 48 millim. in extreme breadth.

34. *Charybdis (Goniosoma) callianassa* (Herbst) A. M. Edw.

? *Cancer callianassa*, Herbst, Krabben. III. ii. 45, pl. liv. fig. 7.

*Goniosoma callianassa*, A. Milne Edwards, Archiv. du Mus. X. 1861, pp. 382, 385 (part).

*Goniosoma variegatum*, Miers, Zool. H. M. S. Alert p. 232 : Cano, Boll. Soc. Nat. Napoli, III. 1889, p. 219 : Thallwitz, Abh. Zool. Mus. Dresden, 1890-91, No. 3, p. 47 : Henderson, Trans. Linn. Soc., (2) V. 1893, p. 376.

A small species, the carapace usually being about 23 millim. long and about 36 millim. in extreme breadth.

Length of carapace about two-thirds the extreme breadth (except in the majority of adult females, in which the last spine of the antero-lateral borders is much prolonged).

Carapace decidedly convex, especially in its posterior half, covered with short pile and crossed transversely by fairly well marked very faintly granular ridges, which are disposed as in *C. crucifera*, except that there is an additional one across the cardiac region.

Front cut into six teeth (not including the inner supra-orbital angles) of which the middle two are slightly the most prominent, the second on either side are broadish with a strong outward slope, and the third on either side are the narrowest and most acute.

Antero-lateral borders cut into six teeth (including the outer orbital angle) of which the first is anteriorly notched with the inner angle acute, and the last is spinelike and from  $1\frac{1}{3}$  to twice (in many adult females nearly three times) the length of the last but one: all the teeth have their free edges finally serrulate (except in the case of the posterior edge of the last).

The posterior border of the dorsal surface of the carapace forms a curve with the postero-lateral borders.

Orbits with a perceptible, but not strong, dorsal inclination: the major diameter is a little more than a third the width of the interorbital space: the inner angle of the lower border is dentiform, but the lobule at the outer end of this border is hardly distinguishable.

There is a granular ridge, but no tooth, on the lobule at the outer angle of the basal antenna-joint.

The chelipeds are about  $2\frac{1}{4}$  times the length of the carapace (in the adult male), and when denuded are smooth and polished except for costæ on the wrist and hand, and for granules on the far end of the upper surface of the arm. There are only two enlarged spines on the anterior border of the arm, and the posterior border of the arm is spineless. Wrist with granular costæ on the upper and outer surface, with the inner angle strongly spiniform, and with three spinules at the outer angle. Palm inflated, barrel-shaped, 6-costate, the four upper costæ granular; only three spines—and those small—on the upper surface. Fingers of the larger cheliped a good deal shorter than the palm.

Merus of last pair of legs  $\frac{3}{5}$  to  $\frac{2}{3}$  as broad as long, with a spine, as usual, near the far end of the posterior border: the same border of the propodite is smooth.

The 2nd and 3rd abdominal terga in both sexes—as well as, to a less extent, the 4th in the female—are transversely carinate: the 6th tergum in the male is transversely oblong with the anterior (true posterior) angles rounded.

In the Indian Museum are 66 specimens, chiefly from the Madras and Orissa coasts, but also from Bombay and Karachi.

The carapace of an exceptionally large male is 29 millim. long and 46 millim. in extreme breadth.

This species is easily distinguished from *C. variegata* De Haan, with which it appears to have been confounded, by the following characters:—

(1) the carapace is very decidedly convex in its posterior half, the regions are less clearly defined, and there is only one transverse ridge on the epibranchial regions—namely the usual one that runs in from the last antero-lateral tooth:

(2) the four middle frontal teeth are blunter and more divergent, and the third on either side is larger and more prominent:

(3) the edges of the teeth of the antero-lateral border are serrulate:

(4) the eyes are smaller and the orbits have a much less marked dorsal inclination; the little lobule at the outer end of the lower border of the orbit is obsolete, instead of being a sharp independent denticle.

(5) there is a ridge, but no tooth, on the lobe of the basal antenna-joint.

(6) there are only 2 large spines on the anterior border of the arm, there are no squamiform granules on the under surface of the arm and hand, there are three spinules on the outer surface of the wrist; the palms are more inflated, their costæ less numerous and less salient, and both the spines immediately behind the finger-joint are obsolete:

(7) the sixth abdominal tergum of the male is transverse oblong with the anterior angles rounded off.

*C. callianassa* has a considerable resemblance to *C. affinis* Dana, from which it may be distinguished by the following characters:—

(1) the carapace is convex instead of nearly flat, the frontal teeth differ, and the teeth of the antero-lateral border are serrulate:

(2) the orbit is more dorsally inclined:

(3) there are only two enlarged spines on the anterior border of the arm: the hands are barrel-shaped and have only 3 spines on their upper surface:

(4) the 6th abdominal tergum of the male has the sides parallel or almost divergent in two-thirds of their extent, whereas in *C. affinis* they form gradually converging curves.

35. *Charybdis (Goniosoma) rostrata*, A. M. Edw.

*Goniosoma rostratum*, A. Milne Edwards, Archiv. du Mus. X. 1861, pp. 379, 385, pl. xxxv. fig 2: J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 377.

A small species: the length of the carapace in adults being somewhere about 20 millim., and the extreme breadth about 25 millim.

Carapace about four-fifths as long as broad in the male, but not quite so long in the female, moderately convex, crossed transversely by granular ridges which are disposed as in *C. crucifera*, except that there is an additional one across the cardiac region (just as in *C. affinis* and *C. callianassa*), densely though finely pilose.

Front as a whole decidedly prominent, cut into six teeth (not including the inner supra-orbital angles), of which the middle two are bluntly pointed and project far beyond the others, the next on either side are broad and slope outwards, and the third on either side are small narrow and nearly straight.

Antero-lateral borders cut into six serrulate teeth, of which the first is very acute and the last is more spinelike than the others.

The posterior border of the dorsal surface of the carapace forms a curve with the postero-lateral borders.

Orbits without any particular dorsal inclination, the major diameter not much less than half the width of the interorbital space, the inner angle of the lower border dentiform, the lobule at the outer end of the lower border distinct but not dentiform.

A strongish granular ridge on the lobule of the basal antennal joint.

Chelipeds less than twice as long as the carapace even in the male, nearly smooth when denuded. Arm with 2 spines on the anterior border and none on the posterior border. Wrist with a strong spine at the inner angle and with two—less commonly three—spinules at the outer angle. Hands inflated in the male, but not much so in the female,



6-costate, the four upper costæ granular; only two spines—and those small—on the upper surface of the hand. Fingers longer than the palm in the smaller cheliped, as long as the palm in the larger cheliped.

The merus of the last pair of legs is nearly as broad as long and has the usual spine on its posterior border; the posterior border of the propodite is smooth.

The 6th tergum of the male abdomen is broader than long and has curved and gradually convergent sides.

In the Indian Museum are 98 specimens, chiefly from the northern parts of the Bay of Bengal, Mergui, and the Gulf of Martaban, but also from off the Andamans and off Ceylon.

### 36. *Charybdis (Goniosoma) variegata* (De Haan).

✓ *Portunus variegatus*, Fabricius, Ent. Syst. Suppl. p. 364.

??? *Cancer callianassa*, Herbst. III. ii. 45, pl. liv. fig. 7.

✓ *Thalamita callianassa*, Milne Edwards, Hist. Nat. Crust. I. 464.

*Charybdis variegatus*, De Haan, Faun. Japon. Crust. pl. i. fig. 2: Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 39.

*Goniosoma callianassa*, A. Milne Edwards, Archiv. du Mus. X. 1861, pp. 382, 385 (part).

*Goniosoma variegatum*, var. *callianassa*, J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 377.

A small species: the carapace in the adult about 20 millim. long and about 35 millim. in extreme breadth.

Carapace about four-sevenths as long as broad (or about two-thirds as long as broad without the enlarged lateral spines), slightly convex, the regions for a *Goniosoma* well defined, crossed transversely by numerous salient granular ridges arranged as in *G. natator*—the ridges standing out from the copious short pile with which the carapace is covered.

Front cut into 6 rather pointed teeth (*not* including the inner supra-orbital angles) of which the middle two are the most prominent and the outer one on either side is the least prominent *and much the slenderest*.

Antero-lateral borders cut into six teeth (including the outer orbital angle) which gradually increase in size from before backwards, the last being a salient spine about twice as long as the last but one—*Neptunus* like.

The posterior border of the dorsal surface of the carapace forms a curve with the postero-lateral borders.

Eyes large: the orbit, *which has a strong dorsal inclination*, is about two-fifths the width of the interorbital space; the inner angle of its

lower border, though not prominently dentiform, is acuminate, and the lobule at the outer end of this border is sharply dentiform.

*There is a prominent tooth on the lobule at the outer angle of the basal antennal joint*: this is present in no other Indian species.

Chelipeds about  $2\frac{1}{3}$  times the length of the carapace (in the male): all three surfaces of the arm and almost all parts of the surface of the hand are covered with granular squamiform markings. Arm with 3 enlarged spines on the anterior border, the posterior unarmed. Wrist costate on the upper and outer surface; the inner angle spiniform; *only two spinules* at the outer angle. Hands (in adults only) more than usually unequal for a *Goniosoma*: in one cheliped (adult) the palm is swollen and markedly longer than the fingers, in the other it is not swollen and is not much longer than the fingers: the hand is 7-costate and there are 4 spines on its upper surface.

The merus of the last pair of legs is about four-fifths as broad as long and has a spine near the distal end of its posterior border, the propodite has one or two inconspicuous spinules near the far end of its posterior border.

In both sexes the 2nd and 3rd abdominal terga are transversely keeled: in the male the 6th tergum is a good deal broader than long and has strongly curved sides.

In the Indian Museum are 43 specimens from the Madras coast and the Persian Gulf, besides one from Nagasaki and one from Hongkong.

### 37. *Charybdis (Goniosoma) natator* (Herbst) A. M. Edw.

*Cancer natator*, Herbst, Krabben. II. v. 156, pl. xl. fig. 1.

*Portunus sanguinolentus*, Bosc, Hist. Nat. Crust. I. p. 218.

*Thalamita natator*, Milne Edwards, Hist. Nat. Crust. I. 463, pl. xvii. figs. 13, 14.

*Charybdis natator*, De Haan, Faun. Japon. Crust. p. 10.

*Charybdis granulatus*, De Haan, Faun. Japon. Crust. p. 42, pl. i. fig. 1: Krauss, Sudafr. Crust. p. 24. Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 39.

*Goniosoma natator*, A. Milne Edwards, Archiv. du Mus. X. 1861, pp. 370, 385: Hilgendorf, MB. Ak. Berl. 1878, p. 801: Miers, Zool. H. M. S. Alert, pp. 518, 539: F. Muller, Verh. Ges. Nat. Basel, VIII. 1886, p. 475: de Man, Archiv. f. Naturges. LIII. 1887, i. p. 334, pl. xiii. fig. 5, and in Weber's Zool. Ergebn. Niederl. Ost.-Ind. II. 1892, p. 285: Walker, Journ. Linn. Soc. Zool. XX. p. 110: J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 374.

Length of carapace about five-sevenths the breadth.

Carapace slightly convex, with a somewhat mangy pile, crossed transversely by several rather coarse granular more or less broken ridges: the most conspicuous of these ridges runs—broken only by the cervical groove—right across between the last teeth of the antero-lateral borders, and in front of this are two—the anterior one widely divided in the middle—on the gastric region, while behind it are two short ones

on either branchial region and a bow-shaped one on the cardiac region.

Front cut into 6 bluntly-rounded teeth (*not* including the inner supra-orbital angles) of nearly equal size.

Antero-lateral borders cut into 6 teeth, of which the first (the outer orbital angle) is blunt or truncated, the last is rather smaller than those immediately in front, and the intervening four though anteriorly acute—especially in the young—tend to grow blunt.

The posterior border of the dorsal surface of the carapace forms a curve with the postero-lateral borders.

Orbit without any particular dorsal inclination, its major diameter is about two-sevenths the width of the interorbital space: the inner angle of the lower border is not prominent and hardly dentiform, the lobule at the outer end of this border though well defined is not dentiform.

Chelipeds about  $2\frac{2}{3}$  times as long as the carapace (in the adult male), their under surface is covered with transverse squamiform tubercles which are specially regular and distinct on the hand, their other surfaces also are beset with tubercles which are more or less distinctly squamiform: the space between the tubercles is furred. Three *enlarged* teeth (besides smaller ones) on the anterior border of the arm, the posterior border unarmed. Inner angle of wrist strongly spiniform, outer angle with three small spines. Hand beset with longitudinal series of tubercles, and having 4 or 5 spines on the upper surface: fingers about as long as hand.

The merus of the last pair of legs is about two-thirds as broad as long and has a strong spine on the posterior border, and the same border of the propodite is armed with spinules that become very indistinct with age.

In both sexes the 2nd-4th abdominal terga are transversely keeled: in the male the 6th tergum is as long as broad and has the sides parallel or even slightly divergent in three-fourths of their extent.

Colours in spirit, mottled, with much admixture of red, the ridges of the carapace dark red.

In the Indian Museum are 10 specimens from Ceylon, Madras, and Pondicherry, besides 1 from Singapore. In the largest specimens the carapace is about 70 millim. long and about 100 millim. broad.

### 38. *Charybdis (Goniosoma) miles* (De Haan).

*Portunus (Charybdis) miles*, de Haan, Faun. Japon. Crust. p. 41, pl. xi. fig. 1. Stimpson Proc. Ac. Nat. Sci. Philad. 1858, p. 39.

*Goniosoma miles*, A. Milne Edwards, Archiv. du Mus. X. 1861, pp. 378, 385. Ortmann, Zool. Jahrb., Syst., VII. 1893, p. 81.

Size medium: an adult female in the Indian Museum has the carapace 43 millim. long and 59 millim. broad.

Carapace not very broad, its length about three-fourths its breadth, little convex, smooth or granular in places when denuded of copious short pile; its anterior half only is crossed transversely by faint granular lines disposed as in *C. crucifera*.

Front cut into six acute teeth, *not* including the acutely dentiform inner supra-orbital angles, of which the two middle ones hardly project beyond the others and the outermost on either side are the narrowest and most acute.

Antero-lateral borders very little oblique, cut into 6 acutely acuminate teeth, of which the first (the outer orbital angle) is broad and anteriorly notched with the inner angle acuminate, and the last is not larger or more prominent than the others.

The posterior border of the dorsal surface of the carapace forms a curve with the postero-lateral borders.

Eyes large: the orbit has a considerable dorsal inclination and its major diameter is nearly half the width of the interorbital space; of the two fissures in its roof the inner is a distinct gap; the inner angle of the lower border is acutely dentiform.

The antero-external angle of the merus of the external maxillipeds is somewhat produced laterally.

The chelipeds are long and, for a *Goniosoma*, are slender; their undersurface is finely granular (as also is a large part of the upper surface of the arm) the granules of the hand showing a squamiform arrangement. The arm has four *large* spines on the anterior border and a spinule at the end of the lower border, but the posterior border is unarmed. The hand is 6-costate, most of the costæ being finely granular, and has 4 acute spines on the upper surface. Fingers slender, very acute, sharply toothed, longer than the palm, which is not swollen.

The last pair of legs have the merus about two-thirds as long as broad and are unarmed except for a spine on the posterior border of the merus and two or three denticles near the far end of the posterior border of the propodite.

The 6th tergum of the male abdomen is much broader than long and has curved and gradually converging sides.

Colours in life red, the tips of spines light, chelipeds mottled red, fingers banded dark and light red.

In the Indian Museum are a male and egg-laden female from the Gulf of Martaban, 53 and 67 fms.

### 39. *Charybdis (Goniosoma) orientalis* (Dana).

? *Charybdis orientalis*, Dana, Proc. Ac. Nat. Sci. Philad. 1852, p. 85, and U. S. Expl. Exp. Crust. pt. I. p. 285, pl. xvii. fig. 10.

*Goniosoma orientale*, A. Milne Edwards, Archiv. du Mus. X. 1861, pp. 383, 385 :

de Man, Notes Leyden Mus. I. 1879, p. 60, V. 1883, p. 151, and XV. 1893, p. 286. Leuz and Richters, Abh. Senck. Nat. Ges. Frankfurt, XII. 1881, p. 422: Cano, Boll. Soc. Nat. Napol. III. 1889, p. 220: J. R. Hendersou, Trans. Linn. Soc. Zool. (2) V. 1893, p. 375.

? *Goniosoma dubium*, Hoffmann in Pollen and Van Dam, Rech. Faun. Madagasc., V. 2, 1874, p. 11, pl. ii. figs. 6-8.

Carapace about two-thirds as long as broad, crossed transversely by salient granular lines which have the same disposition as in *C. variegata* De Haan, except that there is only one on either branchial region behind the level of the last spine of the antero lateral borders.

Front cut into 6 truncated teeth, *not* including the inner supra-orbital angles.

Antero-lateral borders very little oblique, cut into six teeth (including the outer orbital angles) *of which the second is rudimentary and looks like a denticle cut out of the base of the first*, while the last is not enlarged in adults, though in the young it *may* be.

The posterior border of the dorsal surface of the carapace though straight forms a curve with the postero-lateral borders.

Orbit without any particular dorsal inclination, its major diameter a little more than a third the width of the inter-orbital space, the inner angle of the lower border broadly dentiform, the lobule at the outer end of this border distinct but not dentiform.

Arm with 3 spines on the anterior border and none on posterior border: wrist with a strong spine at the inner angle and 2 or 3 spinules on the outer: hand not tumid, 5 spines, of which 4 are large, on the upper surface.

In the fifth pair of legs the merus is nearly twice as long as broad, and has the usual spine on the posterior border: the same border of the propodite is serrated.

In the Indian Museum are five specimens, from the Pedro Shoal, from the Madras coast of the Gulf of Manár, and from off the Arakan coast.

This species is distinguished from *C. anisodon*, which, though not known to occur in Indian Seas, is found at Singapore, by the presence of granular ridges on the carapace, by the five spines (instead of 2) on the hand, and by the serrated (instead of smooth) posterior border of the propodite of the last pair of legs. It is one of the conspicuous links between *Goniosoma* and *Thalamita*.

#### 40. *Charybdis (Goniohellenus) ornata*, A. M. Edw.

*Thalamita truncata*, De Haan, Faun. Japon. Crust. p. 43, pl. ii. fig. 3 and pl. xii. fig. 3 only ♂.

*Charybdis truncata*, Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 39.

*Goniosoma ornatum*, A. Milne Edwards, Archiv. du Mus. X. 1861, pp. 376, 385 : Miers, P. Z. S. 1879, pp. 20, 33, and Challenger Brachyura p. 191 : Ortmann, Zool. Jahrb., Syst., VII. 1893, p. 83 : J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 376 : de Man, Zool. Jahrb., Syst., VIII. 1895, p. 562.

A smallish species : the length of the carapace in adults is about 26 millim., its extreme breadth about 36 millim.

Length of carapace rather over two-thirds the extreme breadth. Carapace moderately convex with the regions fairly well defined, crossed transversely by well marked granular ridges which have much the same disposition as those of *O. crucifera*, except that there are in addition (1) a broad one—divided in the middle line—on the cardiac region, and (2) a short and broad one—or traces of two—on either branchial region.

The front is cut into eight lobes (including the inner supra-orbital angles) arranged in four pairs, of which the outermost pair on either side are bluntly dentiform, and the two middle pairs are broad shallow and lobe-like.

The antero-lateral borders are cut into six teeth (including the outer orbital angles) of which the first is obliquely truncated and the last is the smallest : the edges of all are entire.

The posterior border of the dorsum of the carapace is straight, and forms a somewhat up-turned or dog's-eared angle of junction with the postero-lateral borders.

The orbits have a strong dorsal inclination and their major diameter is not much less than half the width of the inter-orbital space : the inner angle of their lower border is broad and hardly dentiform.

The chelipeds are about  $2\frac{1}{3}$  times the length of the carapace (in the male) and all their surfaces are covered with granular transverse squamiform markings. There are 2—less commonly 3—enlarged spines on the anterior border of the arm and the posterior border ends in a spinule. Inner angle of wrist strongly spiniform, three spinules on the outer angle. Hand 6 or 7 costate—the costæ with squamiform crenations—and with 4 spines on the upper surface. In adults the palm is full and is longer than the fingers in the larger cheliped, but shorter than the fingers in the smaller cheliped.

Merus of last pair of legs about two-thirds as broad as long, with the usual strong spine on the posterior border : the same border of the propodite is finely serrated.

In both sexes the 2nd and 3rd—and to a much less extent the 4th—abdominal terga are transversely keeled : the 6th tergum in the male is broader than long and has strongly curved sides.

In the Indian Museum are 6 fine specimens from the mouth of the

Hughli and Coromandel coast and 1 from the Arakan coast—also 1 from Hongkong and 1 from Java.

41. *Charybdis (Goniohellenus) hoplites*, Wood-Mason.

*Goniosoma hoplites*, Wood-Mason, Ann. Mag. Nat. Hist. (4) XIX. 1877, p. 422: Alcock and Anderson, J. A. S. B. Vol. LXIII. pt. 2, 1894, p. 184, and Ill. Zool. Investigator, Crust. pl. xxiii. fig. 6: Alcock, Investigator Brachyura, p. 67.

A small or smallish species.

The length of the carapace is not much more than half the extreme breadth measured between the tips of the last spine of the antero-lateral borders.

Carapace covered with a dense short tomentum, convex, the regions well defined and fairly well areolated—the convexities of many of the areolæ granular. The gastric region is divided into three sub-regions, the cardiac into two, and there is a very pronounced and independent swelling on the inner part of either branchial region.

A granular ridge crosses the middle of the gastric region transversely, and a similar ridge—strongly arched forwards—crosses each branchial region, beginning on the tip of the last epibranchial spine: these are the only transverse ridges on the carapace, although it sometimes happens that two of the granular subregional convexities of the anterior part of the gastric region are ridge-like.

The front is exactly like that of *C. ornata*, except that the outermost pair of teeth on either side are rather sharper.

The antero-lateral borders are cut into six teeth (including the outer orbital angle) of which the last is a *Neptunus*-like spine at least twice as long as those in front of it: the other 5 are square-cut lobules separated by wide and deep notches, and having their outer edge serrate and their anterior angle acuminate.

The posterior border of the dorsum of the carapace forms a strong dog's-eared angle of junction with the postero-lateral borders.

The orbits are exactly as in *C. ornata*, except that the inner fissure of the roof is wider and the outer fissure less distinct.

The chelipeds in typical specimens are exactly as in *C. ornata*, but it sometimes happens that the granulation of the arm does not cover the whole surface of that joint.

The last pair of legs are as in *C. ornata*, but the breadth of the merus varies from half to two-thirds the length of that joint.

The 6th tergum of the abdomen of the male is truncate-triangular, having almost no curve to the sides.

In the Indian Museum are 45 specimens from off the Coromandel coast, from about 50 to about 110 fathoms, and 4 from off the Indus Delta, 16 to 44 fms.

In an average specimen the length of the carapace is 26 millim., and the extreme breadth 48 millim.

*Charybdis (Goniohellenus) hoplites*, var. *vadorum*.

Differs from the typical deep-sea form in the following particulars:—

(1) the carapace is depressed, therefore the granular convexities of the areolæ stand out in higher relief :

(2) the last spine of the antero-lateral borders is rather longer :

(3) the spine at the inner angle of the wrist is much longer :

(4) Egg-laden females are hardly half the size.

In the Indian Museum are 9 specimens from the Orissa coast,  $7\frac{1}{2}$  to 20 fms., 6 from the Persian Gulf, and 3 from the Arakan coast.

*Charybdis (Goniohellenus) hoplites* var. *pusilla*.

This is a dwarf variety, egg-laden females having a carapace only about 9 millim. long and about 16 millim. in extreme breadth.

The carapace is of a thin texture, the chelipeds and legs are slenderer, and the dorsal bulge of the branchial regions is stronger and sharper.

In the Indian Museum are 300 specimens from off the Konkan coast 56 to 58 fathoms.

*Gonioeupneustes*, Ortmann.

*Gonioeupneustes*, Ortmann, Zool. Jahrb. Syst. etc., VII. 1893-94, p. 79.

This "genus," as Ortmann remarks, is a link between *Charybdis* (= *Goniosoma*) and *Neptunus*. It has much the same bearing to *Goniosoma* that the "genus" *Cronius* has to *Neptunus*, and is one of those forms that would justify any general zoologist in uniting all the *Lupine* "genera" of systematists into one natural genus.

It differs from *Goniosoma* only in the fact that the broad lobular process of the external angle of the basal antenna-joint is not in contact with the front, so that the antennal flagellum is not excluded from the orbital hiatus.

42. *Charybdis (Gonioeupneustes) truncata* (De Haan).

*Portunus truncatus*, Fabricius, Ent. Syst. Suppl. p. 365, and Latreille, Hist. Nat. Crust. VI. p. 16, (*vide* A. M. Edw.).

*Thalamita truncata*, Milne Edwards, Hist. Nat. Crust. I. 463 (*vide* A. M. Edw.).

*Portunus (Thalamita) truncatus*, De Haan, Faun. Japon. Crust. p. 43, pl. xii. fig. 3, ♀ only.

*Portunus (Charybdis) truncatus*, De Haan, Faun. Japon. Crust. p. 65, pl. xviii. fig. 2.



*Goniosoma truncatum*, A. Milne Edwards, Archiv. du Mus. X. 1861, pp. 380, 385, pl. xxxiv. fig. 4.

*Gonioneptunus subornatus*, Ortmann, Zool. Jahrb. Syst. VII. 1893, p. 79, pl. iii. fig. 9.

The lobule of the basal antenna-joint does not touch the front, so that the flagellum stands in the upper part of the orbital hiatus.

The length of the carapace slightly exceeds two-thirds of the extreme breadth.

Carapace covered with a dense short tomentum, moderately convex, the regions ill-defined, crossed transversely by fine granular ridges which have the same disposition and are almost as faint as those of *O. crucifera*: in addition there are small patches of granules on the cardiac and inner part of the branchial regions.

The front is cut into eight teeth (including the inner orbital angles) of which the middle four are broadly triangular and almost acute, while the pair on either side are sub-confluent and form a sort of reduplicated inner supra-orbital angle, somewhat as in *Neptunus* (*Lupocycloporus*) *whitei*.

Antero-lateral borders cut into six teeth, of which the second is the smallest, and the 6th—though more spine-like—is hardly more prominent than those in front of it: all except the sixth are cut rather square, have the free edge serrate, and are anteriorly acuminate—much as in *O. hoplites*.

The posterior border of the dorsal surface of the carapace is practically straight and forms an obtuse angle of junction with either postero-lateral border.

Except that the inner angle of the lower edge of the orbit is denticiform and strongly prominent, and that the inner fissure of the roof is wider, the orbits, and the eyes, are as in *O. ornata*.

Chelipeds not much more than twice the length of the carapace, their upper surface more or less granular, their under surface with smooth-worn squamiform markings. Arm with two more enlarged and one or two less enlarged spines on the anterior border, and one at the far end of the posterior border. Wrist with 3 spinules on the outer angle and a large spine at the inner angle. Hands inflated, strongly 6 or 7-costate—the costæ granular, and with 3 small spines on the upper surface: very similar, in fact, to those of *O. callianassa*. The fingers in the smaller cheliped are as long as, but in the larger cheliped are shorter than, the palm.

The merus of the last pair of legs is nearly as long as broad and has the usual spine on the posterior border: the same border of the propodite is smooth.

In both sexes the 2nd and 3rd abdominal terga are carinate—the 2nd strongly and sharply so. The 6th tergum of the male is truncate-triangular, the sides being very slightly sinuous.

In life the dorsal surface of the carapace is terra-cotta red and there is a good-sized crimson spot towards the inner side of the middle of either branchial region: the exposed dorsal surface of the chelipeds is reddish with numerous darker red markings.

In the Indian Museum there are 6 specimens, including an egg-laden female, from the Gulf of Martaban 53–67 fathoms.

In the male the carapace is about 27 millim. long and about 39 millim. in extreme breadth: in the female it is a good deal smaller.

43. *Charybdis (Gonioneptunus) bimaculata*, Miers.

*Goniosoma variegatum* var. *bimaculatum*, Miers, Challenger Brachyura, p. 191, pl. xv. fig. 3.

As in *C. truncata* the lobule at the outer angle of the basal antenna-joint does not touch the front, so that the antennal flagellum stands in the orbital hiatus.

Length of carapace more than  $\frac{2}{3}$  but less than  $\frac{3}{4}$  the breadth.

Carapace flattish, covered with dense short tomentum, crossed transversely by salient granular ridges arranged exactly as in *C. ornata*.

Front almost similar to that of *C. ornata*, except that, as in *C. truncata*, the outer pair of teeth on either side are sub-confluent and form a sort of reduplicated inner supra-orbital angle.

Antero-lateral borders exactly as in *C. truncata*, except that the last (spine-like) tooth is at least half again as long as any of those in front of it.

Posterior border of dorsal surface of carapace exactly as in *C. truncata*.

Eyes and orbits as in *C. ornata*.

Chelipeds about  $2\frac{1}{4}$  times the length of the carapace. The lower border and the distal half of the upper surface of the arm are granular: there are 2 or 3 spines on the anterior border of this joint, and the posterior border ends in a spine. Upper surface of wrist granular, the inner angle of this joint strongly dentiform, and there are 2 or 3 spinules on the outer angle. Hand in the adult inflated and, except that the squamiform markings of the under surface are almost obliterated, exactly similar to that of *C. truncata*.

Abdomen as in *C. truncata*.

Except that the merus is only about  $\frac{1}{2}$  as long as broad, the last pair of legs are as in *C. truncata*.

In the Indian Museum are 2 small specimens, from Palk Straits

and the Orissa coast, as well as one of the "Challenger" duplicates from Japan.

In the Japanese specimen there is a small dark spot near the middle of either epibranchial region.

Though the sculpture of the carapace and the dorsal inclination of the orbits do certainly give this species a considerable resemblance to *C. variegata*, and though the hands strongly resemble those of *C. callianassa* (which has been confused with *C. variegata*), this species is absolutely different from those, and is very nearly allied to *C. truncata*.

44. *Charybdis (Gonioneptunus) investigatoris*, n. sp.

The lobule of the basal antenna-joint does not touch the front, so that the flagellum stands in the upper part of the orbital hiatus.

Length of carapace nearly five-sixths the breadth.

Carapace little transverse, little convex, the regions indistinct, and the transverse markings extremely indistinct.

Front cut into eight teeth (including the inner orbital angles) of which (1) the middle two are rounded, rather narrow, and distinctly the most prominent (2) the submedian are broad and slant outwards, and (3) the outermost pair on either side are narrow and subacute, and form a sort of reduplicated supra-orbital angle. *The extent of the fronto-orbital border is almost equal to the greatest breadth of the carapace.*

Antero-lateral borders little oblique, cut into six acute teeth with sharp entire edges, of which the first 3 are much larger than the next 2, while the last is a spine only slightly more prominent than the tooth in front of it.

The posterior border of the dorsum of the carapace, though nearly straight forms a curve with the postero-lateral borders.

The eyes and orbits are large—the major diameter of the orbit being at least half the width of the inter-orbital space—but have no particular dorsal inclination: the inner angle of the lower border of the orbit is not dentiform.

Chelipeds slender, about twice the length of the carapace. Four acute spines, three of which are enlarged, on the anterior border, and none on the posterior border. Wrist with 3 spinules on the outer angle and a very long and acute spine at the inner angle. Hand slender with indistinct costæ on the outer surface, with a ridge along the middle of the inner surface, and with four spines on the upper surface—the two on the inner edge of the upper surface being singularly large and acute. Fingers acute, markedly longer than the hand (palm).

Legs long and slender. The merus of the last pair is more than

twice as long as broad and has the usual spine at the far end of the posterior border: there are 1 or 2 spinules on the same border of the propodite of this pair.

The 6th abdominal tergum of the male is truncate-triangular and its line of separation from the preceding segments is indistinct.

A single male specimen, with the carapace 10 millim. long and 12 millim. broad, from off the Ganjam coast, 35 fathoms.

#### THALAMONYX, A. Milne Edwards.

*Thalamonyx*, A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 168: Miers, Challenger Brachyura, p. 192.

Resembles *Charybdis* (= *Goniosoma*) in all essential characters but differs in the following particulars:—

(1) the front proper (not including the inner supra-orbital angles) is broader, being very much more than a third the greatest width of the carapace, and is cut into two broad lobes, not including the inner supra-orbital angles:

(2) the antero-lateral borders are very little oblique, and are cut into 5 teeth only.

Ortmann, whom I am inclined to follow, regards it as only a sub-genus of *Charybdis* (= *Goniosoma*). de Man, on the other hand, is inclined to regard it as identical with *Thalamita*, and there is much to be said in favour of this view also. The fronto-orbital border, however, is not quite so broad and the antero-lateral borders are not, therefore, so nearly parallel, nor is the posterior part of the carapace so contracted nor the inner supra-orbital angle so broad as in most species of *Thalamita*. It is a form that excellently well illustrates the real generic unity of the two supposed genera.

#### 45. *Thalamonyx gracilipes*, A. M. Edw.

*Thalamonyx gracilipes*, A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 169, pl. iv. fig. 3.

*Thalamonyx danæ* var. *gracilipes*, Miers, Challenger Brachyura, p. 192.

*Goniosoma* (*Thalamonyx*) *danæ*, Ortmann, Zool. Jahrb., Syst., VII. 1893-94, p. 83 (part).

Carapace more than two-thirds as long as broad with the regions fairly well defined and the surface granular, some of the granules forming short transverse lines.

Front sublamellar and prominent, divided into two broad shallow lobes of which the inner angles are a little bit pronounced.

Antero-lateral borders little oblique and little arched, forming an obtuse angle little short of a right-angle with the anterior border, cut into five claw-like teeth of nearly equal size.

The posterior border of the dorsum of the carapace is straight but does not form an angle with the postero-lateral borders.

Orbits large, with no particular dorsal inclination, their major diameter about half the width of the inter-orbital space: the inner angle of the lower border is bluntly acuminate but hardly dentiform.

Chelipeds granular: arm with squamiform markings, with 2 spines on the anterior border and none on the posterior border: wrist costate, with 3 tiny spinules on the outer angle and a strong spine at the inner angle: hands not inflated (in the female at least), carinate, with 3 spines on the upper surface.

Merus of last pair of legs hardly half as long as broad, with the usual spine near the far end of the posterior border.

An egg-laden female in the Indian Museum, from the Andamans, has the carapace 7 millim. long and 9 millim. broad.

Miers and Ortmann regard this species as not distinct from *T. danæ*, A. M. Edw. (Nouv. Archiv. du Mus. V. 1869, p. 183, pl. vii. figs. 6, 7).

#### THALAMITA, Latreille, A. M. Edw.

*Thalamita*, Latreille in Cuvier Règne An., Crust. (ed. 2) Vol. IV. p. 33 (foot-note): A. Milne Edwards, Ann. Sci. Nat., Zool., (4) XIV. 1860, p. 228, and Archiv. du Mus. X. 1861, p. 354: Miers, Challenger Brachyura, p. 193.

*Thalamites quadrilatères*, Milne Edwards, Hist. Nat. Crust. I. 457.

Carapace hexagonal (but, owing to the straightness of the antero-lateral borders, with a quadrilateral cast), broad or very broad, depressed or little convex, usually with well marked transverse ridges.

The extent of the fronto-orbital border is usually little less than the greatest breadth of the carapace: the width of the inter-orbital space is from three-fifths to half the greatest breadth of the carapace: and the width of the true front (i.e. excluding the broad inner supra-orbital angles) is from two-fifths to a third the greatest breadth of the carapace.

Front well separated from the broad supra-orbital angles and cut into 2, 4, or 6 lobes or teeth, not including the supra-orbital angles.

Antero-lateral borders hardly oblique, forming almost a right angle with the frontal border, very little arched, cut into 5 teeth (including the outer orbital angle) of which the fourth is often rudimentary and sometimes absent.

Two sutures in the upper border of the orbit: a gap in the lower border, of which border the inner angle is seldom prominent. The antennules fold transversely.

Basal antennal joint having its outer angle enormously produced,

the process being in close contact with the whole length of the inner supra-orbital angle and completely filling the orbital hiatus, from which, therefore, the antennal flagellum is widely excluded.

Epistome sufficiently long: buccal cavern squarish, broader than long, the efferent branchial channels well defined.

Chelipeds and legs as in *Charybdis* (= *Goniosoma*). Abdomen as in *Neptunus*.

Obviously different as the extremes are, the forms included under *Charybdis* (= *Goniosoma*) and *Thalamita* yet constitute an unbroken series, and there is no one character, still less a combination of characters, by which the two groups can be sharply segregated.

Among Indian forms, however, even the most *Charybdis*-like *Thalamites* (e.g. *T. exetastica* and *imparimanus*) never have more than five distinct teeth on the antero-lateral border (though *T. exetastica* has a microscope accessory (6th) denticle on the first tooth), and always have a characteristic broadening of the inner supra-orbital angle; while the most *Thalamita*-like *Charybdes* (e.g. *C. investigatoris*) has the antero-lateral border cut into six distinct teeth and has a narrow inner supra-orbital angle.

### *Key to the Indian species of the genus Thalamita.*

- I. The extreme extent of the basal antenna-joint is far greater than the major diameter of the orbit:—
  - A. Front cut into six lobes of nearly equal size—*exclusive* of the broad inner supra-orbital angles:—
    1. Antero-lateral borders of carapace cut into five teeth of nearly equal size:—
      - i. Transverse ridges of carapace faint: outer surface of palms nearly smooth ..... *T. crenata*.
      - ii. Transverse ridges of carapace very distinct: outer surface of palms costate ..... *T. danz.*
    2. Antero-lateral borders cut into five teeth, of which the 4th is much the smallest:—
      - i. Fourth tooth rudimentary: crest of basal antenna-joint with some large spines ..... *T. prymna*.
      - ii. Fourth tooth rudimentary: crest of basal antenna-joint smooth ..... *T. picta*.
      - iii. Fourth tooth small: basal antenna-joint granular ..... *T. stimpsoni*.

B. Front cut into two lobes—*exclusive* of the broad inner supra-orbital angles :—

1. Inner supra-orbital angles arched, much narrower than either of the frontal lobes :—

i. Frontal lobes distinct and independent : hand covered with squamiform markings, its outer surface costate .....

*T. sima* [*T. arcuata*?]

ii. Median frontal notch indistinct : only the upper part of hand granular, its outer surface smooth or very indistinctly costate :—

a. Teeth of antero-lateral border of carapace acute, the last more prominent than the others .....

*T. poissonii* [? *T. sima*.]

b. Lobes of antero-lateral border square-cut, the last not enlarged .....

*T. chapali*.

2. Inner supra-orbital angles straight or little arched, not much narrower than either of the frontal lobes :—

i. Crest of basal antenna-joint smooth : 4th tooth of antero-lateral borders of carapace rudimentary.. ..

*T. integra*.

ii. Crest of basal antenna-joint granular, denticulate, or spinose :—

a. Crest granular or dentate : 4th tooth of antero-lateral borders rudimentary : fingers rather stumpy .....

*T. admeta*.

b. Crest granular or dentate : 4th tooth small : fingers sharp and as long as the palm .....

*T. savignyi*.

c. Crest spinose : 4th tooth somewhat smaller than the others : frontal lobes prominent, with their angles though rounded strongly pronounced.....

*T. quadrilobata*.

II. The extreme extent of the basal antenna-joint is equal to, or less than, the major diameter of the orbit :—

A. Front cut into six lobes—*exclusive* of the inner supra-orbital angles :—

1. Antero-lateral borders of the carapace cut into five teeth, of which the fourth is rudimentary :—

- i. All the frontal teeth clearly cut and on the same level, the middle pair much narrower than the submedian pair ..... *T. investigatoris.*
    - ii. The middle frontal teeth are not very clearly defined from, are on a lower plane and are not much narrower than, and are somewhat overlapped by the submedian pair ..... *T. imparimanus.*
  - 2. Antero-lateral borders cut into five teeth, of which the last two are much smaller than the others: all the frontal teeth clearly cut, the median on a lower plane and hardly narrower than the submedian pair..... *T. sœtastica.*
- B. Front cut into four lobes—*exclusive* of the inner supra-orbital angles :—
  - 1. Median lobes of the front narrower than the lateral lobes :—
    - i. Front sinuous, the median lobes more prominent than the others :—
      - a. Median frontal lobes moderately prominent: antero-lateral borders of carapace cut into five teeth, of which the 4th is the smallest ..... *T. senlobata.*
      - b. Median frontal lobes conspicuously prominent: antero-lateral borders cut into four teeth, of which the 3rd is the smallest ..... *T. hanseni.*
    - ii. Front perfectly straight: antero-lateral borders cut into five teeth of which the 4th is the smallest ... *T. intermedia.*
  - 2. Median lobes of the front very much broader than the lateral lobes :—
    - i. Wrist with 3 sharp spinules on the outer surface, hand with granular costæ on outer surface, fingers about as long as the palm ..... *T. wood-masoni.*
    - ii. Outer surface of wrist and hand nearly smooth, fingers shorter than palm ..... *T. taprobanica.*
- C. Front cut into two lobes—*exclusive* of the inner supra-orbital angles :—
  - 1. Front very slightly convex, hardly prominent beyond the supra-orbital angles: carapace markedly transverse, its antero-lateral borders cut into five teeth of



- which the last 2 are very much smaller than the first 3 ..... *T. oculæa*.  
 [2. Front convex and markedly prominent beyond the supra-orbital angles: carapace little transverse, its antero-lateral borders cut into five teeth of nearly equal size ..... *Thalamonyx gracilipes*].

*Thalamita prymna* (Herbst) Kossmann.

The following names are, in my opinion, all synonymous, namely:—*T. prymna*, *T. crenata*, *T. danæ*, *T. stimpsoni* and *T. picta*. But as it is only occasionally that one encounters specimens that show a combination or confusion of characters I prefer, for convenience, to consider the usually accepted species as distinct. I believe, however, that Kossman's view as to the specific identity of all the *Thalamitas* with an eight-lobed front combined with a very broad basal antenna-joint, untenable as that opinion appears at first sight, is the correct one.

46. *Thalamita crenata* (Latr.) Edw.

*Thalamita crenata*, Latr., Milne Edwards, Hist. Nat. Crust. I. 461: Gnérin in Cuvier, Icon. Règne An. Crust. Texte p. 6 (cor. *Thalamita admete* Guérin, Icon. Règne An. Crust. pl. i. fig. 4): Rüppell, 24 Krabben roth. Meer. p. 6, pl. i. fig. 2: Krauss, Sudafr. Crust. p. 25: Stimpson, Proc. Ac. Nat. Sci. Philad. 1859, p. 39: A. Milne Edwards, Archiv. du Mus. X. 1861 pp. 365, 367; Nouv. Archiv. du Mus. IV. 1868, p. 70 and IX. 1873, p. 166: Heiler, SB. AK. Wien, XLIII. 1861, p. 356 and Novara Crust. p. 29: Martens, Verh. zool.-bot. Ges. Wien XVI. 1866, p. 381: Hilgendorf, MB. AK. Berl. 1878, p. 800: Hoffmann in Pollen and van Dam, Faun. Madagasc., Crust. p. 9: Lenz and Richters, Abh. senck. Ges. Frankf. XII. 1881, p. 422: Miers, Zool. H. M. S. Alert, pp. 184, 232, 518, 540; and Challenger Brachyura p. 199: Muller, Verh. Ges. Nat. Basel, VIII. 1876, p. 475: de Man, Journ. Linn. Soc., Zool., XXII. 1887-88 p. 79; and in Weber's Zool. Ergebn. Niederl. Ost-Ind. II. 1892, p. 285; and Zool. Jahrb., Syst., &c., VIII. 1894-95 p. 569: Cano, Boll. Soc. Nat. Napol. III. 1889, p. 218: Thallwitz, Abh. Zool. Mus. Dresden 1890-91, No. 3, p. 47: G. Pfeffer, Mitt. Naturhist. Mus. Hamburg, VII. 1890, No. 8, p. 7: Ortman, Zool. Jahrb., Syst., VII. 1893-94, p. 86; and in Semon's Forschungsr. (Jena. Denk. VIII.) Crust. p. 46.

*Thalamita prymna* var. *crenata*, Richters in Möbius, Meeresf. Maurit. p. 153.

Carapace, length two-thirds the breadth, slightly convex, nearly smooth, crossed transversely by fine faint granular ridges—one, broken only by the cervical groove, between the last spines of the antero-ateral borders, one across the middle of the gastric region, and a series of four crescentic ridges (of which however the middle two are usually obsolete) defining the gastric region anteriorly.

Front cut into six rounded lobes of nearly equal size, not including

the arched inner supra-orbital angles each of which is as broad as any two of the true frontal lobes.

Antero-lateral borders cut into five clawshaped teeth of nearly equal size, or slightly decreasing in size from before backwards.

Posterior border of dorsal surface of carapace forming a curve with the postero-lateral borders, its length about one-third the greatest breadth of the carapace.

Orbits without any dorsal inclination, their major diameter about one-fifth the width of the interorbital space: the inner angle of their lower border dentiform and fairly prominent.

The basal antenna-joint is about two-ninths the greatest breadth of the carapace in extent, its orbital prolongation is in nearly the same straight line with its stem, and is traversed by a granular ridge.

Chelipeds a little unequal, the larger one in the male being about  $2\frac{1}{4}$  times the length of the carapace, with a nearly smooth surface. Anterior border of arm with 3 enlarged spines and some granules, posterior border with a few squamiform granules only. Inner angle of wrist stoutly dentiform, outer surface with three teeth imperfectly united by costæ. Hand with five spines (most of which are blunt and sometimes become obsolescent), in two rows, on the upper surface—those of either row being more or less connected by a ridge which is in part granular: there are no other distinct ridges on the hand except a faintish one in the neighbourhood of the immobile finger. The fingers of the larger hand are not quite as long as the somewhat swollen palm, those of the smaller hand are as long as their palm.

Legs smooth, unarmed except for the usual spine at the far end of the posterior border of the merus of the last pair and for 2 or 3 denticles (which, however, are often absent) on the posterior border of the propodite of the last pair.

The 6th abdominal tergum of the male is broader than long and has gently curved sides.

Large males in the Indian Museum collection have the carapace about 40 millim. long and about 60 millim. broad.

In the Indian Museum are 34 specimens, from the Andamans, Mergui, Bombay, Karachi and the Persian Gulf (besides specimens from Penang, Singapore, Australia, and Samoa).

#### 47. *Thalamita Danæ*, Stimpson.

*Thalamita crenata*, Dana, U. S. Expl. Exp. Crust. pt. I. p. 282, pl. xvii. figs. 7 a-b.

*Thalamita Danæ*, Stimpson, Proc. Ac. Nat. Sci. Philad. (1858) 1859, p. 39: A. Milne Edwards, Archiv. du Mus. X. 1861, pp. 366, 367, pl. xxxvi. fig. 1: Miers, Cat. Crust. New Zealand, p. 29: Hilgendorf, MB. Ak. Berl. 1878, p. 800: Richters

in Möbius Meeresf. Maurit. p. 153: Tenison Woods, P.L.S., N. S. Wales, V. 1880-81, p. 118: Filhol, Crust. New Zealand, Miss. de l'île Campbell, p. 382: (?) de Man, Archiv. f. Naturges. LIII. 1887, i. p. 334; and Journ. Linn. Soc., Zool., XXII. 1887-88, p. 78 pl. iv. figs 8, 9; and in Weber's Zool. Ergebn. Niederl. Ost-Ind. II. 1892, p. 285; and Notes Leyden Mus. XV. 1893, p. 285; and Zool. Jahrb., Syst., VIII. 1894-95, p. 569.

Differs from *T. crenata* in the following particulars:—

(1) the carapace is nearly three-fourths as long as broad, its posterior border is nearer two-fifths than a third its greatest breadth, its transverse ridges are very distinct, and the four crescentic ridges near the anterior limit of the gastric region are all prominent, especially the middle two:

(2) the front, though otherwise similar, is more prominent:

(3) a large part of the upper surface of the arm and wrist and at least the dorsal half of the surfaces of the hand are granular,—the granules being more or less squamiform; the ridges that connect the spines of the wrist are distinct; there are 6 or 7 costæ on the hand, and the spines of the hand are much sharper:

(4) the 6th abdominal tergum of the male is much broader than long, and its sides are divergent in two-thirds of their extent and then suddenly converge.

In the Indian Museum are 20 specimens from the Andamans and Mergui.

#### 48. *Thalamita prymna* (Herbst).

*Cancer prymna*, Herbst, Krabben, III. iii. 41, pl. lvii. fig. 2.

*Thalamita prymna*, Milne Edwards, Hist. Nat. Crust. I. 461: Krauss, Sudaf. Crust. p. 25: De Haan, Faun. Japon. Crust. p. 43, pl. xii. fig. 2: A. Milne Edwards, Archiv. du Mus. X. 1861, pp. 360, 367, and Nouv. Archiv. du Mus. IX. 1873, p. 163: Hess, Archiv. f. Naturges. XXXI. 1865, i. pp. 140, 171: Hoffmann, in Pollen and van Dam Faun. Madagasc. Crust. p. 9: Kossmann, Crust. roth. Meer. p. 47 (part): Streets, Bull. U. S. Nat. Mus. VII. 1877, p. 108: Neumann, Cat. Pod. Crust. Heidelb. Mus. p. 24: de Man, Notes Leyden Mus. II. 1880, p. 180; and Archiv. f. Naturges. LIII. 1887, i. p. 333; and Journ. Linn. Soc. Zool. XXII. 1887-88, p. 75, pl. iv. figs. 5, 6; and in Weber's Zool. Ergebn. Niederl. Ost-Ind. II. 1892, p. 285; and in Zool. Jahrb., Syst., VIII. 1894-95, p. 567: Richters, in Möbius Meeresf. Maurit. p. 153: Miers, Ann. Mag. Nat. Hist. (5) V. 1880, p. 238; and Challenger Brachyura, p. 197: Sluiter, Tijds. Nederl. Ind. XL. 1881, p. 162: Haswell, Cat. Austral. Crust. p. 80: Ortmann, Zool. Jahrb., Syst., VII. 1893, p. 84; and in Semon's Forschungs. (Jena. Denk. VIII.) Crust. p. 46: Henderson, Trans. Linn. Soc., Zool., (2) V., 1893, p. 372.

*Thalamita crassimana*, Dana, Proc. Ac. Nat. Sci. Philad. 1852, p. 85; and U. S. Expl. Exp. Crust. pt. I. p. 284, pl. xvii. figs. 9a-d: Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 39.

Differs from *T. crenata* in the following particulars:—

(1) the carapace is even less convex, and, as in *T. Danse*, its trans-

verse ridges are very distinct, moreover the mid-gastric ridge is continued, following the curves of the orbits, to the notch between the 1st and 2nd spines of the antero-lateral borders :

(2) the front is somewhat more prominent, the teeth are closer set and the four middle ones are remarkably square-cut :

(3) the teeth of the antero-lateral border end in spines and the fourth tooth is quite rudimentary and may even be altogether absent :

(4) the basal antenna-joint is nearer a fourth than two-ninths the greatest breadth of the carapace in extent, and its orbital prolongation is traversed by a row of spines of which from 1 to 3 are large :

(5) except that they are free from hair and that all the spines are large and much more acute, the chelipeds are like those of *T. Danæ*, but the granules on the upper surface of the arm are less numerous, and the faint ridge that separates the lower and inner surfaces of the hand in *T. Danæ* is absent :

(6) the propodite of the last pair of legs has its posterior border serrated throughout :

(7) the 6th abdominal tergum of the male is about as long as broad, and has gently convergent sides.

In the Indian Museum are 35 specimens, from the Andamans, Nicobars, Mergui, and Madras coast (besides 1 from Samoa).

#### 49. *Thalamita picta*, Stimpson.

*Thalamita picta*, Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 39: A. Milne Edwards, Archiv. du Mus. X. 1861, pp. 362, 367, and Nouv. Archiv. du Mus. IX. 1873, p. 164, pl. iv. fig. 4: Hilgendorf, MB. Ak. Berl. 1878, p. 800: Miers, Zool. H. M. S. Alert, pp. 518, 540: Cano, Boll. Soc. Nat. Napoli, III. 1889, p. 217.

Differs from *T. prymna* in the following slight particulars:—

(1) the basal antenna-joint is not so broad and its crest is tooth-like, having a smooth entire edge :

(2) the two middle frontal teeth project more than the others.

In the Indian Museum there is a single specimen from the Andamans.

#### 50. *Thalamita Stimpsoni*, A. M. Edw.

*Thalamita stimpsoni*, A. Milne Edwards, Archiv. du Mus. X. 1861, pp. 362, 367, pl. xxxv. fig. 4, and Nouv. Archiv. du Mus. IX. 1873, p. 164: ? Tozzetti, Magenta Crust. p. 71, pl. v. figs. 4 a-f: Miers, Ann. Mag. Nat. Hist. (6) V. 1880, p. 238; and Zool. H. M. S. Alert, pp. 184, 232; and Challenger Brachyura, p. 198: Tenison Woods, P. L. S. N. S. Wales, V. 1880-81, p. 118: Haswell, Cat. Austral. Crust. p. 80: Müller, Verh. Nat. Ges. Basel VIII. 1886, p. 475: Cano, Boll. Soc. Nat. Napol. III. 1889, p. 217: Ortmann, Zool. Jahrb., Syst., VII. 1893-94, p. 85, and in Semon's Forschungar. (Jena. Denk. VIII.) Crust. p. 46.

Differs from *T. prymna* in the following slight particulars :—

- (1) the basal antenna-joint has a row of granules, but no spines :
- (2) the inner supra-orbital angles are broader :
- (3) the 4th spine of the antero-lateral border is usually not so complete a rudiment.

In the Indian Museum is one specimen from the Andamans (besides others from Singapore, Hongkong and Australia.)

This, as Miers has remarked, is one of the forms that supports Kossmann's view as to the identity of all the preceding species of *Thalamita*.

### 51. *Thalamita Chaptalii*, Aud. et Savign.

*Portunus Chaptalii* Andouin, Explic. p. 83 Savigny Descr. Egypte Crust. pl. iv. fig. 1.

*Thalamita chaptalii*, Milne Edwards, Hist. Nat. Crust. I. 460 : A. Milne Edwards, Archiv. du Mus. X. 1861, pp. 360, 367 : Miers, Zool. H. M. S. Alert, p. 231 (foot-note) : Cano, Boll. Soc. Nat. Napol. III. 1889, p. 216.

? *Thalamita sima*, Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 373.

Carapace two-thirds as long as broad, pilose, considerably convex, the transverse ridges distinct and disposed as in the preceding species except that there is an additional one running across the cardiac region and on to the branchial region on either side, its endings on the branchial regions being the most distinct part of its course.

Front proper forming a broad shallow arch grooved but not deeply divided in the middle line: the inner supra-orbital angles, which have their anterior border curved, are very much less wide than the frontal lobes proper.

Antero-lateral borders cut into five teeth, of which the fourth, though considerably smaller, and the fifth, though somewhat smaller than the other three, are quite well developed: the first three teeth are somewhat square-cut, the first being very distinctly so.

The posterior border of the dorsum of the carapace is straight but forms a curve with the postero-lateral borders, its length is slightly more than a third the greatest breadth of the carapace.

Orbits without any particular dorsal inclination, their major diameter about one-fourth the width of the interorbital space: the inner angle of the lower border is not pronounced.

The basal antenna-joint is between a fifth and a sixth the greatest breadth of the carapace in extent, and is traversed by a low smooth crest.

Chelipeds about  $2\frac{1}{2}$  times the length of the carapace: usually only two enlarged teeth—and those blunt—on the anterior border of the

arm, the posterior border and part of the upper surface granular : upper surface of wrist granular and costate, inner angle strongly spiniform, the usual spinules on the outer angle obsolescent. Hand rather full, upper surface granular, with the usual two parallel crests and five spines : the spines however are blunt and small, and the anterior two of the outer row are usually obsolete : except for a few indistinct costæ the other parts of the hand are smooth : the fingers are slightly longer than the hand, except in the larger cheliped of the adult male.

The merus of the last pair of legs is nearly twice as long as broad and has the usual spine on its posterior border : the same border of the propodite is smooth.

The sixth abdominal tergum of the male is a good deal broader than long and has the sides parallel or slightly divergent in at least two-thirds of their extent.

A small species : the largest male in the Indian Museum has the carapace 13 millim. long and a little less than 21 millim. in extreme breadth, and there are several egg-laden females a good deal smaller.

147 specimens from the Andamans (one take), besides several from Mauritius.

## 52. *Thalamita Poissonii*, Andouin et Savign.

*Portunus Poissonii*, Andouin, Explic. p. 84 Savigny, Descr. Egypt. Crust. pl. iv. fig. 3.

*Thalamita Poissonii*, de Man, Notes Leyden Mus. II. 1880, p. 181 : Cano, Boll. Soc. Nat. Napoli, III. 1889, p. 216.

Differs from *T. chaptalii* in the following particulars :—

(1) the teeth of the antero-lateral borders are acute, and the last tooth is more spiniform and more prominent than the others :

(2) the posterior border of the propodite of the last pair of legs is armed with 2 or 3 small spinules :

(3) the teeth on the anterior border of the arm are acute.

In the Indian Museum are two specimens from the Persian Gulf. I much doubt that this is distinct from *T. chaptalii*.

## 53. *Thalamita sima*, Edw.

*Thalamita sima*, Milne Edwards, Hist. Nat. Crust. I. 460 : Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 39 : A. Milne Edwards, Archiv. du Mus. X. 1861, pp. 359, 367 ; and Nouv. Archiv. du Mus. IV. 1868, p. 70, and IX. 1873, p. 163 : Miers, Cat. Crust. New Zealand, p. 28 ; and P.Z.S. 1879, pp. 20, 32 ; and Zool. H.M.S. Alert, pp. 184, 231, 518, 539 ; and Challenger Brachyura, p. 195 : Kossmann, Reise roth. Meer., Crust. p. 50 : Tozzetti, Magenta Crust. p. 78, pl. vi. figs. 1 a-e : Hilgendorf, MB. Ak. Berl. 1878, p. 800 : Tenison Woods, P.L.S. N.S. Wales, V. 1880-81, p. 118 : Haswell, Cat. Austral. Crust. p. 80 : Filhol, Crust. New Zealand, Miss. ile Campbell, p. 332 : Muller, Verh. Nat. Ges. Basel, VIII. 1886, p. 476 : ? de Man, Journ. Linn. Soc., J. II. 11

Zool., 1887-88, p. 75, and Zool. Jahrb. Syst. VIII. 1894-95, p. 564: Cano, Boll. Soc. Nat. Napoli, III. 1889, p. 216: Walker, Journ. Linn. Soc., Zool., XX. p. 110: Ortmann, Zool. Jahrb. Syst. VII. 1893-94, p. 84, and in Semon's *Forschungen*. (Jena. Denk. VIII) Crust. p. 46: ? J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 373.

*Portunus (Thalamita) arcuatus*, De Haan, Faun. Japon. Crust. p. 43, pl. ii. fig. 2.

Differs from *T. Chaptalii* in the following particulars:—

(1) the front proper, though arched as a whole, is distinctly divided into two broad shallow lobes the rounded outer angles of which are very distinctly separated from the supra-orbital angles:

(2) the antero-lateral borders are cut into 5 acute teeth of which the last is decidedly the largest and most prominent:

(3) the inner angle of the lower border of the orbit is more prominent:

(4) the chelipeds are everywhere more granular, their under surface especially being covered with transverse squamiform markings: the small spines on the outer surface of the wrist are well marked: the hand is everywhere covered with transverse squamiform markings and is very distinctly 6 or 7-costate, and on its upper surface are 5 distinct spines, of which 4 are large and acute.

In the Indian Museum is a single specimen from the Persian Gulf (besides 12 from Hongkong and Nagasaki).

Our specimens are undoubtedly the *Thalamita arcuata* of De Haan, which, according to A. Milne Edwards is synonymous with *T. sima* of Milne Edwards.

#### 54. *Thalamita admeta* (Herbst) Edw.

*Cancer admete*, Herbst, Krabben III. iii. 40, pl. lvii. fig. 1.

*Portunus admete* Latr., Audouin Explic. p. 84, Savigny Descr. Egypt. Crust. pl. iv. fig. 4.

*Thalamita admete*, Cuvier Règne Animal Crust. pl. ix. fig. 2: Milne Edwards, Hist. Nat. Crust. I. 459: Krauss, Sudafr. Crust. p. 24: Dana, U. S. Expl. Exp. Crust. pt. I. p. 281, pl. xvii. figs. 5 a-c: Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 39: A. Milne Edwards, Archiv. du Mus. X. 1861, pp. 356, 367; and Nouv. Archiv. du Mus. IX. 1873, p. 162: Heller, SB. Ak. Wien, XLIII. 1861, i. p. 355: and Crust. Sudl. Europ. p. 79, pl. ii. fig. 17. (*vide* Guérin); and Novara Crust. p. 23: Streets, Bull. U. S. Nat. Mus. VII. 1877, p. 105: Hilgendorf, MB. Ak. Berl. 1878, p. 799: Richters in Möbius Meeresf. Maurit. p. 153: Miers, Zool. H. M. S. Alert, pp. 183, 230; and Challenger Brachyura, p. 194: Carus, Prod. Faun. Medit. p. 515, (*vide* Guérin): de Man, Archiv. f. Naturges. LIII. 1887, i. p. 382; and in Weber's Zool. Ergebn. Niederl. Ost.—Ind. II. 1892, p. 285: Thallwitz, Abh. Zool. Mus. Dresden 1890-91, No. 3, p. 46: Ortmann, Zool. Jahrb., Syst., VII. 1893-94, p. 83; and in Semon's *Forschungen*. (Jena. Denk. VIII) Crust. p. 46: J. R. Henderson, Trans. Linn. Soc. Zool. (2) V. 1893, p. 372: Whitelegge, Mem. Austral. Mus. III. 1897, p. 138.

*Thalamita savignyi*, A. Milne, Edwards, Archiv. du Mus. X. 1861, pp. 357 and 367, and Nouv. Archiv. du Mus. IX. 1873, p. 163: Kossmann, Reise roth. Meer. Crust. p. 49: de Man, Notes Leyden Mus. II. 1880, p. 180, and III. 1881, p. 99; and Journ. Linn. Soc. Zool. XXII. 1887-88, p. 73; and Zool. Jahrb., Syst. etc., VIII. 1894-95, p. 564: Cano, Boll. Soc. Nat. Nap. III. 1889, p. 215: J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 372: Ortmann in Semon's Forschungar. (Jena. Denk. VIII). Crust. p. 46.

Carapace only about five-ninths to three-fifths as long as broad, pilose, flat, crossed transversely by granular ridges which have the same disposition as in *T. danæ*, *crenata*, etc., except that, as in *T. chapatalii*, *sima* etc., there is an additional one across the cardiac region and extending, with an interruption, on to either branchial region.

Inter-orbital space divided into four square-cut lobes of nearly equal width: the middle two, which form the front proper, are laminar and are considerably the more prominent: the outer two, which are the broad inner supra-orbital angles, have a straight, or inappreciably curved anterior border.

Antero-lateral borders cut into 5 acute claw-like teeth, of which the 4th is much smaller than the others and is often rudimentary.

The posterior border of the dorsum of the carapace forms a curve with the postero-lateral borders: its length is a little less than a third the greatest breadth of the carapace.

The orbits have no particular dorsal inclination, their major diameter is about a fifth the width of the inter-orbital space, the inner angle of their lower border is bluntly dentiform.

Basal antenna-joint nearly a fourth the greatest breadth of the carapace in extent: its orbital extension traversed by a serrated crest.

Chelipeds unequal in the adult male. Three enlarged teeth on the anterior border of the arm: the posterior border granular in its distal half. Upper and outer surface of wrist costate and slightly granular, 2 or 3 spinules at the outer angle, the inner angle strongly spiniform. Hand full and deep, with 5 costæ on the upper and outer surfaces: on the upper two costæ are altogether 6 spines, of which the distal two are the smallest: the other surfaces of the hand are generally smooth, but there may be a faint bulge or ridge along the inner surface and an incomplete line of granules along the lower border. Fingers a good deal shorter than the hand (especially in the larger cheliped) rather stumpy, and though sharp-pointed showing an inclination to be channelled along the inner surface: the dactylus is decidedly hook-like.

In some individuals the hand, except for the two spinose costæ on the upper surface and for traces of two costæ on the outer surface, is quite smooth. In others there are only four distinct spines on the hand,—the two small ones immediately behind the finger-joint being



obsolescent. In the variety *savignyi* the hand is not particularly full or deep, and the fingers, which are as long as the hand, are not channelled along the inner surface.

The merus of the last pair of legs is nearly twice as long as broad and has the usual spine near the far end of the posterior border; the posterior border of the propodite of this pair is serrated throughout.

The 6th abdominal tergum of the male is not much broader than long, its sides are slightly but gradually convergent.

The carapace of an average male in the Indian Museum is 15 millim. long and 26 millim. broad, but there is a specimen much larger than this from the "South Seas."

In the Indian Museum are 45 specimens from the Andamans, Mergui, Palk Straits and Persian Gulf.

Three varieties of this species are recognizable, but the differences between them are very inconstant and are not, in my opinion, of specific value:—

(1) *Thalamita admeta* (Herbst). "Der Hand ist gross, auf der aussern Wölbung gekornt."

(2) *Thalamita admeta* A. M. Edw. "Main portant.....sur la face externe deux crêtes peu marquées et lisses."

(3) *Thalamita savignyi* A. M. Edw., which differs in the following particulars:—

(a) the transverse ridges of the carapace are in sharper relief: (b) the division between the 2 true frontal lobes is not always broad and deep: (c) the fourth tooth of the antero-lateral borders, though smaller than the others, is not rudimentary: (d) the hand is not particularly full and deep, and its inner surface is sometimes granular, all the granular costæ of the outer surface being well-marked also: (e) the fingers are straighter, are as long as the palm, and have no particular channelling of the inner surface.

#### 55. *Thalamita quadrilobata*, Miers.

*Thalamita quadrilobata*, Miers, Zool. H. M. S. "Alert," pp. 518, 539, pl. xlviii. fig. B; and Challenger Brachyura, p. 194.

Differs from *T. admeta* in the following particulars:—

(1) the carapace is not quite so broad, its length being about three-fifths its breadth:

(2) the two lobes that form the front proper project very much more beyond the two lobes that form the supra-orbital angles and their free edges are so concave and their angles therefore are so pronounced that the front (not including the supra-orbital angles) appears four-lobed:

(3) the fifth tooth of the antero-lateral borders though smaller than the others is by no means a rudiment:

(4) the crest of the basal antenna-joint is armed with a row of 3 large spines like those of *T. prymna*.

(5) the hands and fingers are like those of the *var. savignyi*: i.e., the hand is distinctly costate, some of its inner surface is granular, and the fingers are as long as the hand and have no particular channelling of the inner surface.

In the Indian Museum there is a single specimen from the Andaman Islands: the length of the carapace is 22 millim., its breadth 35 millim.

This form is probably only a variety of *T. admeta*.

#### 56. *Thalamita integra*, Dana.

*Thalamita integra*, Dana, Proc. Ac. Nat. Sci. Philad. VI. 1852, p. 85 and U. S. Expl. Exp. Crust. pt. I. p. 281, pl. xvii. figs. 6 a-d: Stimpson, Proc. Ac. Nat. Sci. Philad., 1858, p. 39: A. Milne Edwards, Archiv. du Mus. X. 1861, pp. 358, 367, and in Maillard's Île Réunion, Annexe F. p. 2: Streets, Bull. U. S. Nat. Mus. VII. 1877, p. 107: Hilgendorf, MB. Ak. Berl. 1878, p. 799: Richters in Möbius Meeresf. Maurit. p. 153: Miers, Zool. H. M. S. Alert, pp. 518, 540, and Challenger Brachyura, p. 195: de Man, Journ. Linn. Soc., Zool., XXII. 1887-88, p. 74: Cano, Boll. Soc. Nat. Nap. III. 1889, p. 215: Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 373: Whitelegge, Mem. Austral. Mus. III. 1897, p. 138.

Closely allied to *T. admeta* from which it can be recognized by the following characters:—

(1) the carapace is not quite so broad and is distinctly convex: it is bare of tomentum and the transverse ridges are much less distinct, the one that crosses the cardiac region being obsolescent or absent:

(2) the crest of the basal antenna-joint has a sharp entire edge:

(3) the surface of the chelipeds is smooth and polished: the costæ of the wrist are worn and in great part obliterated, and the usual 3 spines at the outer angle of this joint are indistinct blunt points: the hand is quite smooth; the inner border of its upper surface is crest-like and bears two teeth, there is a blunt tooth in the usual place in front of the apex of the wrist-joint, and in front of this are one or two blunt tubercles; there may also be a smooth ridge running along the distal two-thirds of the lower border of the hand:

(4) the 6th abdominal tergum of the male is much broader than long.

In the Indian Museum are two specimens—from Mergui and the Andamans (besides a "Challenger" duplicate from Honolulu).

#### 57. *Thalamita investigatoris*, n. sp.

Carapace about two-thirds as long as broad, covered with a velvet-

like pile, crossed by transverse ridges disposed as in *T. sima*, *admeta*, etc.—i.e., there is an additional ridge extending across the cardiac and neighbouring parts of the branchial regions—but they are all faint.

Front cut into six lobes (not including the inner supra-orbital angles) very similar to those of *Charybdis* (= *Goniosoma*) *callianassa*, i.e., the middle two are narrow rounded and more prominent than the others, the next on either side are broad, and the third on either side are very narrow and are subacute.

Antero-lateral borders straight, cut into 5 acute teeth (including, as usual, the outer orbital angles) of which the first 3 are large, the 5th very small, and the 4th a rudiment.

Posterior border straight, but forming a curve with the postero-lateral borders, its length hardly more than two-fifths the greatest width of the carapace.

Orbits large, their major diameter more than two-fifths the width of the interorbital space: the inner angle of the lower border not denticiform.

The basal antenna-joint is not equal to the major diameter of the orbit in its extreme extent: its crest is low and denticulated.

Chelipeds markedly unequal in the adult male, their upper surface with close-set vesicular granules: two or three enlarged spines on the anterior border of the arm, none on the posterior border: inner angle of wrist spiniform, two or three minute points on the outer angle: hand not costate, with only two distinct spines,—one being in front of the apex of the wrist-joint, the other, which is the larger, being some way behind the finger joint: [the other spines usually present in *Thalamita*, if present, are not distinguishable from the general granulation]. Fingers shorter than the hand, especially in the larger cheliped.

First 3 pair of legs long and slender, banded with brown. The merus of the last pair is more than twice as long as broad and has the usual spine on the posterior border: there are also a few spinules on the posterior border of the propodite of this pair.

Sixth abdominal tergum of male a good deal broader than long, its sides parallel in their proximal half and then suddenly converging.

A single male from off Ceylon, 34 fathoms.

A small species, the carapace being 8 millim. long, and 11.5 millim. broad.

#### 58. *Thalamita exetastica* n. sp.

Closely resembles *T. investigatoris*, from which it differs in the following particulars:—

(1) the median frontal teeth are on a lower plane than, and are almost as broad as, the submedian teeth:

(2) the teeth of the antero-lateral border gradually decrease in size from before backwards, the 4th and 5th being extremely small; moreover there is a tiny tooth cut in the base of the first, somewhat after the manner of *Goniosoma orientale*, but very much smaller:

(3) the carapace is three-quarters as long as broad, and the length of the posterior border is more than half the greatest breadth of the carapace:

(4) all surfaces of the chelipeds, except that part of the upper surface of the arm that is concealed by the carapace, are covered with transverse squamiform markings; the hand is costate and there are at least 4 distinct spines on its upper surface, two of which along the inner border are particularly large; the fingers are as long as the palm.

(5) the legs are not particularly long and slender; the merus of the last pair is about two-thirds as broad as long, and the posterior border of the propodite is smooth.

A mature female and a young male from off the Malabar coast, 26-31 fms.

A small species, the carapace being 9 millim. long and 12 millim. broad. It is more nearly related to *Oharybdis* (= *Goniosoma*) than is any other of these small *Thalamites* with reduced basal antenna-joint.

59. *Thalamita imparimanus*, n. sp.

Closely resembles *T. investigatoris*, from which it differs in the following particulars:—

(1) the transverse ridges of the carapace are prominent:

(2) the median frontal teeth are about as broad as, are on a lower plane than, and are to some extent overlapped by, the submedian teeth:

(3) the basal antenna-joint is quite *Goniosoma*-like, its greatest extent being less than half the major diameter of the orbit: its crest is almost indistinguishable:

(4) the chelipeds, though otherwise similar, have the inequality in the male even more marked and there are no points on the outer angle of the wrist that are distinct from the general granulation:

(5) the legs are even longer and slenderer, and the posterior border of the propodite of the last pair is smooth:

(6) the line of junction between the 6th and 7th abdominal terga of the male is concave instead of straight.

Three specimens from off the Ganjam coast, 35 fathoms.

The carapace of the largest is 7 millim. long and 10 millim. broad.

60. *Thalamita seslobata*, Miers.

*Thalamita seslobata*, Miers, Challenger *Brachyura*, p. 196, pl. xvi. fig. 2: Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 373.

Carapace nearly three-fourths as long as broad, flattish, closely pilose, the transverse ridges distinct and disposed as in *T. sima*, *admata* and *investigatoris*.

Front cut into 4 lobes (not including the supra-orbital angles) of which the middle pair are the narrowest and slightly the most prominent and on a slightly lower plane, while the outer pair are the broadest, being also broader than the arched supra-orbital angles from which they are separated by a distinct notch.

Antero-lateral borders cut into 5 teeth, of which the first is the largest and the fourth is a mere rudiment, while the fifth is sometimes smaller and sometimes larger than the third.

Posterior border of the usual shape, its length is nearly half the greatest breadth of the carapace.

Orbits large, with a somewhat dorsal inclination, their major diameter is about a third the width of the inter-orbital space: the inner angle of the lower border not dentiform.

Basal antenna-joint about equal to the major diameter of the orbit in extreme extent: its crest is low and either entire or finely granular.

Chelipeds pilose, covered with transverse squamiform markings. Two enlarged spines on the anterior border of the arm, none on the posterior border. Inner angle of wrist strongly spiniform, three spinules on outer angle. Hand costate, with 4 or 5 (usually 4) spines, of which the most conspicuous are the 2 along the inner border of the upper surface. Fingers of the smaller cheliped rather longer, of the larger cheliped rather shorter, than the hand.

First 3 pair of legs with transverse squamiform markings on the upper surface. In the last pair the merus is nearly twice as long as broad and has the usual spine on the posterior border, and the same border of the propodite is smooth.

Sixth abdominal tergum of male with arched sides, the tergum being broader than long and much broader at its base than at its far end, though the base is not quite the broadest part.

In the Indian Museum are 15 specimens, from the Arakan coast, Andamans, and Persian Gulf. The carapace of an egg-laden female is 9 millim. long and 12.5 millim. broad.

#### 61. *Thalamita Hanseni*, n. sp.

Carapace two-thirds as long as broad, slightly convex, somewhat pilose, crossed by transverse ridges which have the same disposition as in *T. admata*, *sexlobata* etc.

Front deeply cut into 4 lobes (not including the inner supra-orbital

angles) of which the middle two are narrow rounded and prominent beyond the outer two which are broad: the latter are well separated from the supra-orbital angles, which are arched and are about the same breadth as the middle frontal lobes.

Antero-lateral borders cut into 4 acute teeth (*including* the outer orbital angles) of which the first and last are the largest.

Posterior border of dorsum of carapace straight, but forming a curve with the postero-lateral borders, its length is half the greatest width of the carapace.

Orbits large, their major diameter about two-fifths the width of the inter-orbital space, the inner angle of their lower border is not dentiform, and they have no particular dorsal inclination.

Basal antenna-joint less than the major diameter of the orbit in extreme extent, its crest is smooth.

Chelipeds of usual form: three spines on the anterior border of the arm, none on the posterior border, the distal half of the upper surface with squamiform markings: inner angle of wrist strongly spiniform, three spinules on the outer angle: hand with 5 spines, in the usual position, the two behind the finger-joint the smallest, there are 2 or 3 obscure costæ and some indistinct squamiform markings on the outer surface: fingers shorter than the palm, especially in the larger cheliped.

Legs slender: the meras of the last pair is more than twice as long as broad and has the usual spine on the posterior border, the same border of the propodite of this pair has 2 or 3 spinules.

6th abdominal tergum of male much broader than long, with gradually convergent sides.

Three specimens were dredged by a Danish Expedition off Trincomalee in 2 fathoms, and have been very kindly lent to me for examination by Dr. H. J. Hansen. The carapace of the largest specimen is 6 millim. long and 9 millim. broad.

## 62. ? *Thalamita intermedia*, Miers.

*Thalamita intermedia*, Miers, Challenger Brachyura, p. 196, pl. xvi. fig. 1: Ortmann, in Semon's Forschungs. (Jena, Denk. VIII.) Crust. p. 46.

"The carapace is broadly transverse, and is covered with a close, whitish pubescence, the transverse ridges which cross its dorsal surface are not more distinct than in *Thalamita admete* to which species and to *Thalamita savignyi*, *Thalamita intermedia* is nearly allied.

"Of the six lobes of the front the median are smallest, and separated by a narrow and rather deep incision, the submedian and lateral are subequal, the latter slightly overlapping the former; the lateral lobes project somewhat less than the others.

"The five spines of the antero-lateral margin are all well developed, but the three anterior are very slightly larger than the fourth and fifth.

"The basal antennal joint is very distinctly granulated; the maxillipeds present nothing remarkable.

"The chelipeds in the male are subequal, the merus or arm with three spines on its anterior margin, of which the two nearest to the distal extremity are largest; wrist with a strong spine on its inner margin and three small spinules on its outer surface, palm with three or four spines disposed alternately in two series, on its upper surface, and with three granulated ridges on its outer surface, between which are other granules, as in *Thalamita savignyi*; the fingers are somewhat shorter than the palm, and irregularly denticulated on their inner margins.

"The ambulatory legs slender and slightly compressed; the fifth legs shaped much as in *Thalamita admeta* and *Thalamita savignyi*, with a spine near the distal end of the inferior margin of the merus-joint, and with the inferior margin of the penultimate joint armed with a very distinct series of small spinules.

Colour (in spirit) pinkish-brown; pubescence whitish."

The above is Miers' description, which I have copied, as I am not perfectly sure of the identity of our specimen. It should be added that the basal antenna-joint is "*Goniosoma*"-like, its extreme extent being less than the major diameter of the orbit, and that the front is cut perfectly straight.

In the Indian Museum is a single egg-laden female from off Ceylon 34 fms. The carapace is 5.5 millim. long and 9 millim. in extreme breadth.

### 63. *Thalamita Wood-Masoni*, n. sp.

Carapace nearly three-fourths as long as broad, convex, crossed transversely by ridges, which have the same disposition as in *T. sima*, *T. admeta*, *T. investigatoris*, etc., and are all very distinct and straight.

Front cut into 4 rather obscurely marked lobes (*not* including the inner supra-orbital angles) of which the two middle ones are very broad and the two lateral ones very narrow: the inner supra-orbital angles, which are well arched, are broader than the lateral lobes of the front but much narrower than the median lobes.

Antero-lateral borders nearly straight, cut into 5 sharp teeth, of which the 4th is rudimentary and is visible only when the carapace is denuded of its close pile.

Posterior border of dorsum of carapace straight but forming a curve with the postero-lateral borders, its length is rather more than two-fifths the greatest breadth of the carapace.

Orbits without any particular dorsal inclination : their major diameter nearly a third the width of the inter-orbital space : the inner angle of the lower border not dentiform.

Basal antenna-joint about equal to the major diameter of the orbit in extreme extent, traversed by a low microscopically-granular crest.

Chelipeds rather pilose : the arm has 3 spines on the anterior border, none on the posterior border, the exposed part of its upper surface has some squamiform granules : wrist costate and granular, its inner angle spiniform, 3 sharp spinules on its outer angle : hand with numerous granular costæ, and with 5 sharp and very distinct spines in the usual position : fingers about as long as the hand in the smaller cheliped, shorter than the hand in the larger cheliped.

Merus of last pair of legs slender, more than twice as long as broad, with the usual spine on the posterior border : the posterior border of the propodite of the same pair has some spinules.

The 6th abdominal tergum of the male is a good deal broader than long, its sides are suddenly convergent near the distal end and its distal border is concave.

In the Indian Museum is a single specimen from the Andamans. Among the specimens kindly lent me for examination by Dr. H. J. Hansen of the Copenhagen Museum is a male from Paumban (Palk Str.).

A small species · carapace 9 millim. long, 12·5 millim. broad.

*Thalamita Wood-Masoni* var. *taprobanica*.

Differs from *T. Wood-Masoni*, type, much as *T. admeta* differs from var. *T. savignyi* :—

(1) the frontal lobes are deeper cut :

(2) the sculpture of the chelipeds is much less distinct : the squamiform markings on the arm wrist and hand, and the costæ of the wrist and hand are much worn ; the spinules on the outer angle of the wrist are blunt and obsolescent ; and the spines on the upper surface of the hand are small and blunt—the anterior two of the outer row being smaller and blunter than the others ; the fingers are much shorter.

In the Indian Museum is a single specimen from Ceylon.

64. *Thalamita ocula* n. sp.

Carapace rather more than two-thirds as long as broad, closely and densely pilose. When denuded, the transverse ridges are prominent and more numerous than in any other Indian species, because besides the ridges found in *T. danæ* etc., and besides the additional ridge across the cardiac and neighbouring part of the branchial regions found in



*T. sima*, *admeta* etc., there is—behind all—another short ridge or linear tubercle on either branchial region.

Front proper straight, obscurely divided into 2 lobes (*not* including the inner supra-orbital angles) by a notch that needs looking for with a lens. The inner supra-orbital angles are arched and their breadth is not half that of either of the true frontal lobes.

Antero-lateral borders nearly straight, cut into 5 teeth, of which the first is the largest and the last two (which are co-equal) are very much smaller than any of the others.

Posterior border of dorsum of carapace straight, but forming a curve with the postero-lateral borders; its length is rather more than half the greatest breadth of the carapace.

Orbits with a distinctly dorsal inclination, large—their major diameter being little less than half the width of the inter-orbital space—the fissures in the upper border obscure, the inner angle of the lower border not dentiform.

Basal antenna-joint Goniosoma-like, its extreme extent being much less than the major diameter of the orbit, its crest low and smooth.

Chelipeds pilose, covered with transverse squamiform markings: 2 enlarged teeth on the anterior border of the arm, none on the posterior border: inner angle of wrist strongly spiniform, 2 or 3 inconspicuous denticles on the outer angle: hand costate, with 4 or 5 (usually 4) spines, of which only three (namely, the one in front of the apex of the wrist-joint and the two along the inner border of the upper surface) are visible to ordinary observation, the other 1 or 2 being lost in the general squamiform granulation.

Legs pilose, the first 3 pair with squamiform sculpture on the upper surface: in the last pair the merus is nearly twice as long as broad, and has the usual spine on its posterior border, and the propodite has a smooth posterior border.

Sternum with numerous transverse grooves—a sort of scutiform sculpture—most conspicuous in the male.

6th abdominal tergum of male a good deal broader than long, with gradually convergent sides.

7 specimens from off Ceylon, 28–34 fms., 1 from off Malabar coast 26–31 fms., 3 from the Andaman Sea.

A small species: the carapace of the largest egg-laden female is 9 millim. long and 13 millim. broad.

### Alliance III. *Podophthalmoida*.

#### PODOPHTHALMUS, Lamk.

*Podophthalmus*, Lamarck, *Syst. Anim. sans. Vert.* V. p. 152, and *Hist. Nat.*

Anim. sans. Vertebr. V. p. 255 : Latreille, Hist. Nat. Crust. VI. p. 53 : Leach, Zool. Miscell. II. p. 147 : Desmarest, Consid. Gen. Crust. p. 99 : Milne Edwards, Hist. Nat. Crust. I. 465 : De Haan, Faun. Japon. Crust. p. 10 : A. Milne Edwards, Ann. Sci. Nat., Zool., (4) XIV, 1860, pp. 283, 228, and Archiv. du Mus. X. 1861, p. 419 : Miers, Challenger Brachyura, p. 207.

Carapace extremely broad. Its antero-lateral borders are almost transverse in the greater part of their extent and then turn obliquely backwards to end in a large spine; they are deeply grooved along their whole extent to receive the enormously elongate eye-stalks. The groove is an extension of the true orbit, which also encroaches on the dorsal surface of the front, so that the true front comes to lie beneath the roots of the eye-stalks, cut off from the rest of the carapace except for a narrow isthmus left between the eye-stalks.

The true front, which thus lies below the eye-stalks but in its normal relation to the antennules and antennæ, is extremely narrow.

Close behind the spine that terminates the antero-lateral border is another, smaller, spine.

The eyes are borne on slender basal stalks of peculiar length: the orbits, as already explained, occupy the whole extent of the antero-lateral border, even extending on to the lateral epibranchial spine. The antennules are lodged in fossæ beneath the front, into which they are not completely retractile.

The antennæ are also in their normal position in the wide orbital hiatus: the basal joint is short, the flagellum long and slender.

The epistome though short, or even linear, and though encroached upon by the external maxillipeds, is well defined. Buccal cavern squarish broader than long: efferent branchial channels ill defined.

Chelipeds legs and abdomen as *Neptunus*.

As M. A. Milne Edwards has remarked *Podophthalmus* is merely an abnormal *Neptunus*.

#### 65. *Podophthalmus nacreus*, n. sp.

Carapace broadly hexagonal, approaching the oblong-quadrate, its length just over half its breadth (lateral spines included) its regions fairly well delimited, its surface finely granular.

Front proper (that is, the piece almost cut off from the rest of the carapace by the encroachment of the eye-stalks) horizontal, distinctly bilobed, its breadth about a sixth that of the carapace (spines included).

Antero-lateral borders distinctly arched, or angularly bent, the lower edge of the groove for the eye-stalks very prominent and forming almost a quadrant of a broad ellipse, the lateral epibranchial spine short—its length about half the width of the front.

Postero-lateral borders not at all strongly convergent, the spine at their anterior end sharply carinate. Posterior border straight, its length is half the greatest width of the carapace (spines included).

Eyes, with the eye-stalks, well over half the greatest breadth of the carapace (spines included).

The maxillipeds in repose almost close the mouth, a narrow space being left between them: the antero-external angle of the merus produced and lobe-like. Epistome almost linear.

Chelipeds in the male nearly three times the greatest length of the carapace: anterior border of arm with a row of spines the distal 2 of which are enlarged, posterior border with 2 enlarged spines in its distal half: inner angle of wrist strongly spiniform, a spine followed by a carina along the outer surface of wrist: hand very sharply carinated on the upper and outer surfaces, armed with 2 spines—one in front of the apex of the wrist-joint, the other behind the finger-joint: dactylus very little shorter than the palm.

First 3 pair of legs slender: a short spine on the posterior border of the merus of the 4th pair.

2nd and 3rd abdominal terga carinate in both sexes: 6th tergum in the male much broader than long, with converging sides.

Colours in spirit yellowish; the edges of the carapace, the crests and spines of the chelipeds, and the carinæ of the abdomen have much the same nacreous sheen as in *Neptunus argentatus*.

In the Indian Museum are 3 specimens from the Andamans, and one from the Gulf of Martaban 53 fms. The carapace of the largest specimen is 12 millim. long and 23 millim. broad.

This species in several respects approaches *Euphylax*. It differs from *Podophthalum vigil* in the following particulars:—

(1) the carapace is almost oblong-quadrate, its antero-lateral borders are curved or angularly bent, its surface is granular and its regions better defined:

(2) the buccal cavern is squarer and is more nearly closed by the external maxillipeds, the antero-external angle of the merus of which is produced to form a lobule: the epistome is linear:

(3) the front is horizontal and bilobed:

(4) the lateral epibranchial spine is much shorter:

(5) the hand is very sharply carinated and the fingers are nearly as long as the palm.

### Family CANCRIDÆ.

*Canceriens arqus* (*Pseudocarcinus* and *Pirimela* only) Milne Edwards Hist. Nat. Crust. I. 371: and *Corystiens*(part) Milne Edwards, *op. cit.* II. 139.

*Cyclinea* and *Corystoidea* (part) Dana, U. S. Expl. Exp. Crust. pt. I. pp. 294 and 296; Miers, Challenger Brachyura, pp. 208 and 209.

*Cancerini* (exc. *Carcinus*) and *Xanthini* (*Thiidae* only) Ortmann, Zool. Jahrb. Syst. VII. 1893-94, pp. 421 and 428.

Carapace moderately convex, either broadly transversely-oval (as in the *Cancerinæ*) or elongate-oval or subcircular or (rarely) somewhat hexagonal, the regions rarely strongly defined and rarely areolated.

Front not very broad, commonly cut into 3 teeth, which are sometimes prominent: [sometimes (*Thiinæ*) the front is subentire or bilobed; in *Acanthocyclus* it is triangular and pointed.]

The antennules always fold longitudinally.

Antennal flagella usually long, coarse, and setaceous [absent in *Acanthocyclus*, short and slender in *Kraussia*].

Epistome usually sunken, always more or less overlapped by the external maxillipeds which are often somewhat elongate.

Legs gressorial.

Sternum narrow.

I propose to divide the *Canceridæ* into the following five subfamilies:—

Subfamily I. *Cancerinæ*. Carapace broadly transverse, oval, the antero-lateral borders cut into many teeth or puckers, the regions either not defined or fairly well defined and areolated. Front cut into 3 teeth. Buccal orifice about square. Epistome but slightly sunken and slightly overlapped by the external maxillipeds, which completely close the mouth and have the merus not elongate. Basal antenna-joint fixed.

Constituent genera:—

1. \**Cancer*, Linnk., Leach, A. Milne Edwards Nouv. Archiv. du Mus. I. 1865, p. 185.

2. *Metacarcinus*, A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 201.

3. *Trichocarcinus*, Miers, P.Z.S. 1879, p. 34 (= *Trichocera*, De Haan, Faun. Japon. Crust. p. 16).

Subfamily II. *Pirimelinæ*. Carapace somewhat hexagonal, not transverse, regions very well defined and areolated, antero-lateral borders cut into 5 teeth. Front cut into 3 teeth. Buccal orifice moderately elongate. Epistome a good deal sunken and much overlapped by the external maxillipeds which completely close the mouth. Basal antenna-joint fixed.

Includes a single genus, namely

\* *Pirimela*, Leach, Milne Edwards, Hist. Nat. Crust. I. 423.

Subfamily III. *Thiinae*. Carapace subcircular the regions not defined, antero-lateral borders entire or denticulate. Front entire, or cut into two lobes which may again be subdivided into two lobules. Buccal orifice moderately elongate, the external maxillipeds, which completely cover the mouth, encroach somewhat on the very short epistome. Basal antenna-joint fixed.

Constituent genera :—

1. *Thia*, Leach : Milne Edwards, Hist. Nat. Crust. II. 143.
2. \**Kraussia*, Dana.

Subfamily IV. *Atelecyclinae*. Carapace subcircular, often a little longer than broad, the regions usually fairly or well defined, not much areolated, antero-lateral borders usually with teeth. Front usually cut into 3 (sometimes 2 or 4) teeth which are often prominent. Buccal orifice elongate, not completely covered by the external maxillipeds which are elongate—especially as to their merus—and overlap or completely conceal the sunken epistome. Basal antenna-joint either fixed or slightly movable.

Constituent genera :—

1. \**Atelecyclus*, Milne Edwards, Hist. Nat. Crust. II. 141.
2. *Erimacrus*, Benedict Proc. U. S. Nat. Mus. XV. 1892, p. 229 (= *Podacanthus*, Brandt, Bull. Phys. Math. Acad. Petersb. VII. 1849, p. 180).
3. \**Hypopeltarium*, Miers, Challenger Brachyura, p. 210 (= *Peltarion*, Lucas in Jacquinot's Voy. Astrolabe au Pol. Sud., Zool. III. Crust. p. 80).
4. *Pliosoma*, Stimpson, Ann. Lyc. Nat. Hist. New York, VII. 1862, p. 227.
5. \**Telmessus*, White Ann. Mag. Nat. Hist. XVII. 1846, p. 497 and Samarang Crust. p. 14 (= *Platycorystes*, Brandt, Bull. Phys. Math. Acad. Petersb. VII. 1848, p. 179 : = *Cheiragonus*, Latr.).
6. \**Trachycarcinus*, Faxon.
7. \**Trichopeltarium*, A. Milne Edwards.

Subfamily V. *Acanthocyclinae*, carapace subcircular. Front ending in a triangular point. Epistome short sunken, completely concealed by the external maxillipeds which also completely cover the buccal orifice. Antennal flagella absent. For the single genus

*Acanthocyclus*, Milne Edwards and Lucas, Voy. Amer. Merid. Crust. p. 29.

[? Subfamily *Trichiinae* for *Trichia* De Haan, Faun. Japon. Crust. p. 109, which may however be the type of a distinct family.]

In the foregoing lists the genera known to me by autopsy are marked with an asterisk and Indian genera are printed in Roman type. I have made no attempt to split the Subfamilies into "alliances" as I have not sufficient material at my disposal for such a purpose.

### Subfamily THINÆ.

#### KRAUSSIA, Dana.

*Kraussia*, Dana, Silliman's Amer. Journ. Sci. and Arts. XIII. 1852, p. 120, and U. S. Expl. Exp. Crust. pt. I. p. 300.

Carapace not much broader than long, not concealing the first three abdominal terga even in the male, subcircular but with the antero-lateral borders much longer than the postero-lateral, and the latter rather strongly convergent and slightly concave: the regions not defined.

Front well separated from and prominent beyond the inner supra-orbital angles, almost horizontal, cut into two lobes which may, or may not, be again divided into two lobules.

The antennules fold alongside their basal joint, much nearer the longitudinal than the transverse.

The basal antenna-joint touches the front and occupies all the space between the antennular pits and the orbit: the flagellum, which is short and slender, stands in the orbital hiatus.

Buccal cavern squarish, a little elongate: the external maxillipeds—of which the merus is not elongate—slightly overlap the epistome, which though short and sunken, is well enough defined. No ridges on the palate to define the efferent branchial channels.

Chelipeds massive, short and stumpy with particularly stumpy fingers.

Legs short and stout, ending in blade-like dactyli.

The abdomen of the male consists of 5 segments, the 3rd-5th terga being fused.

Sternum narrow.

#### *Key to the Indian species of Kraussia.*

- I. Carapace somewhat broad, its frontal and antero-lateral borders conspicuously dentate: front bilobed ..... *K. integra*.
- II. Carapace somewhat elongate, its frontal and antero-lateral borders minutely denticulate: front four lobed ..... *K. nitida*.

#### 1. *Kraussia integra* (De Haan).

*Cancer (Xantho) integer*, De Haan, Faun. Japon. Crust. p. 66, pl. xviii. fig. 6.

? *Kraussia rastripes*, F. Müller, Verh. Ges. Basel. VIII. 1886, pp. 475, 480, pl. iv. fig. 5.

Carapace about four-fifths as long as broad, little convex, smooth to the naked eye, but with fine transverse subsquamiform pitting under the lens.

Frontal, orbital, and antero-lateral borders elegantly uniformly and conspicuously denticulate, and fringed (except the infra-orbital border) with long stiff silky hairs. Similar hairs fringe the legs, the arm and the inner angle of the wrist, and the anterior edge of the external maxillipeds.

Front cut into two broad lobes, each of which shows a very slight tendency to be divided into two lobules. Dorsal surface of roof of orbit without any marked grooves.

Chelipeds about as long as the carapace, the hand the most massive joint: the fingers are very short and stumpy, the dactylus closing very obliquely on a short straight immobile finger that is little better than a tubercle. On the outer surface of the hand is some fine subsquamiform sculpture: on the upper surface of the finger are some bluntly-dentiform granules in rows, and there are some granules near the inner angle of the wrist.

Legs stoutish, slightly shorter and much less massive than the chelipeds: the dorsad surfaces of the propodites and dactyli—as of the carpopodites also in their distal end—are abundantly and elegantly denticulate. All the dactyli are blade-like.

In the Indian Museum are two specimens from the Andamans.

## 2. *Kraussia nitida*, Stimpson.

*Kraussia nitida*, Stimpson. Proc. Ac. Nat. Sci. Philad. 1858, p. 40: Miers, Zool. H. M. S. Alert, pp. 184, 235: J. B. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 379, pl. xxxviii. fig. 9.

Differs from *K. integra* in the following particulars:—

(1) The length of the carapace is more than four-fifths the breadth, and the carapace is more convex from side to side:

(2) The frontal, orbital, and antero-lateral borders are minutely, instead of conspicuously, denticulate, and the hairs that fringe them are more scanty:

(3) The front is more prominent and is cut into 2 lobes each of which is deeply cut into 2 lobules:

(4) There are two distinct though fine grooves in the roof of the orbit, one of which passes far back on to the carapace and imitates a cervical groove:

(5) The chelipeds are quite smooth except for a few granules at the inner angle of the wrist:

(6) The dactyli of the legs are more broadly blade-like, and the last three joints of the legs are without any denticulations or have only a trace of them on the propodite.

In the Indian Museum are two specimens one from the Andamans, 20 fms., the other from off the Ganjam coast, 9 fms.

### Subfamily ATELECYCLINÆ.

#### TRICHOPELTARIUM, A. M. Edw.

*Trichopeltarium*, A. Milne Edwards, Bull. Mus. Comp. Zool. VIII. 1880, p. 19.

Carapace oval or subcircular, as long as or longer than broad, strongly convex, its borders spinate.

Front prominent, not very broad, cut into 3 sharp teeth or spines.

Orbits shallow, defined by spines with considerable gaps between them: inner suborbital angle spiniform. Eye-stalks slender.

The antennules fold longitudinally. The basal antenna-joint is short and subcylindrical; the flagellum coarse, stout, setaceous.

Epistome of fair length, fairly well defined, sunken, and overlapped by the external maxillipeds. Buccal orifice square-cut, longer than broad, not completely covered by the external maxillipeds, which are somewhat elongate and have the merus a little narrower than the ischium. Efferent branchial regions defined by ridges which do not reach up to the epistome.

Chelipeds massive and unequal in the male.

Legs stout, hairy, more or less spiny, ending in stout styliform dactyli: they are longer and are not much less massive than the female chelipeds.

### 3. ? *Trichopeltarium ovale*, Anderson.

? *Trichopeltarium ovale*, Anderson, J.A.S.B. Vol. LXV. pt. 2. 1896, p. 103; Ill. Zool. Investigator, Crust. pl. xxv. figs. 4-4a: Alcock, Investigator Deep Sea Brachyura, p. 57.

Carapace egg-shaped, covered with spines which on its dorsal surface are bifid or multifid, and with short stiff but not very conspicuous hairs. The regions are well defined by coarse grooves: the gastric is divided into three sub-regions, and the cardiac into two, and on either side of the cardiac region a semilunar area is marked off on the branchial region.

The front, which is cut into three prongs, is about one-seventh the greatest breadth of the carapace, and is separated from the orbit by a deep notch.

The orbits are very incomplete: they are formed by a prominent



preocular tooth (parallel with, but less prominent than, the front), below which at the inner suborbital angle is an almost equally prominent coarse spine: there are also two other teeth—one at the external orbital angle, and the other between this and the preocular tooth—hardly distinguishable from the ordinary spines of the carapace. The eyestalks which are slender, tapering, and of good length, do not nearly fill the shallow orbital cavity.

The antennules fold longitudinally in fossæ, beneath the front: their basal joint is large. The antennæ arise almost in the same transverse line with the antennules: their basal joint forms a large part of the floor of the orbit.

The epistome is sunk below (*i.e.* is really arched much above) the plane of the external maxillipeds. The efferent branchial channels are defined by an incomplete ridge, and are patulous. The external maxillipeds are slender, and leave the mandibles exposed between them: the merus is obovate and narrower than the ischuim, the palp is coarse.

The chelipeds and legs are spiny and bristly, the spines in the case of the legs being well pronounced only on the dorsal surface of the meropodites.

In the female the chelipeds are shorter and not much stouter than the legs and are about as long as the carapace.

The legs are little unequal in length, the first pair which are slightly the longest being hardly half as long again as the carapace: they all end in long, stout, cylindrical, sharply styliform dactyli.

The abdomen of the female is seven-jointed and covered with coarse hairs: the first two segments are broader, and on them the spines decrease in size to the seventh segment which is smooth.

The colour in life is recorded by Dr. A. R. Anderson as pale bluish yellow.

Length of carapace and rostrum 64 millim., breadth 55·5 millim., depth 35 millim.

A single female from off the west coast of Ceylon 180–217 fms., on a foul bottom of broken coral.

#### TRACHYCARCINUS, Faxon.

*Trachycarcinus*, Faxon, Bull. Mus. Comp. Zool. XXIV. 1893, p. 156, and Mem. Mus. Comp. Zool. XVIII. 1895, p. 25: Alcock, Investigator Deep Sea Brachyura, p. 58.

“Carapace pentagonal, moderately convex, lateral margins long, nearly straight, toothed. Front narrow, produced, three-toothed. Orbits large with forward aspect, imperfect, with two hiatuses above

one below, and one at the inner angle; lower wall formed chiefly by the carapace. Anterior margin of buccal cavity not distinctly defined, epistome short, ridges of the endostome developed. Sternum long and rather narrow. Abdomen of male narrow and five-jointed, the third, fourth, and fifth segments consolidated. Eye-stalks very small, retractile within the orbits. Antennules longitudinally folded. The antennæ lie in the inner hiatus of the orbit; their basal segment is but slightly enlarged, not filling the hiatus at the inner angle of the orbit nor attaining to the front, subcylindrical, unarmed, imperfectly fused with the carapace; the second segment is longer and slenderer than the first, the third segment about equal to the second in length, but slenderer; all these segments are furnished with long and coarse setæ; the whole antenna is less than one-half as long as the carapace. The ischium of the outer maxillipeds is produced at its antero-internal angle; the merus of the same appendages is rounded at the antero-external angle, obliquely truncated but not emarginated at the antero-internal angle, where it articulates with the following segment. Legs of moderate length. Right and left chelipeds very unequally developed in the male. Dactyli of ambulatory legs styliform, straight slender, longer than the penultimate segments."

#### 4. *Trachycarcinus glaucus*, Alcock and Anderson,

*Trachycarcinus glaucus*, Alcock and Anderson, Ann. Mag. Nat. Hist. Jan. 1899, p. 8: Alcock, Investigator Deep Sea Brachyura, p. 59, pl. ii. fig. 2.

Carapace irregularly pentagonal, its surface coated with short stiff club-shaped hairs; the regions well defined, rather tumid, much subdivided into tumid lobules, of which the convexities are capped by clusters of large conical granules and the general surface also is studded especially in the young with similar granules.

Front narrow, horizontal, prominent, deeply cleft into three prongs of nearly equal size.

Antero-lateral borders half as long again as the postero-lateral, armed with three stout pinnulate spines not including the outer orbital angle: postero-lateral borders entire, posterior border finely beaded.

Upper orbital wall deeply cleft into three pinnulate teeth, lower orbital border deeply concave, its inner angle strongly spiniform. Eye-stalks slender, rather long: the eyes, which are more ventral than terminal, are dull and faintly pigmented (as in many species of *Munidopsis*), and are non-facetted.

Antennal flagella short, extremely slender, not hairy.

Chelipeds remarkably unequal in the male, equal in the female.

The smaller cheliped of the male and both chelipeds of the female

are about as long as the carapace, and are coated, almost to the finger-tips, with stiff club-shaped hairs, which are short except along the upper border of the wrist and hand and of the basal part of the finger, where they are long: beneath the hairs are some scattered granules, and along the upper border of the arm, wrist and hand are some denticles: the inner angle of the wrist is strongly spiniform, and the far end of the upper border of the hand is dentiform.

The larger cheliped of the male is about twice the length of the carapace, about half its length being formed by the hand and fingers: the greatest breadth of the hand is about half the length of the carapace. It is almost smooth, the upper border of the arm and hand, and the inner border and upper and outer surfaces of the wrist, alone being furnished with denticles and hairs: the inner angle of the wrist is spiniform.

The legs are covered with short stiff club-shaped hairs which are rather more thick-set on the anterior borders and on the dactyli than elsewhere. The second and third pair, which are rather longer than the first and last pair are somewhat less than  $1\frac{1}{2}$  times the length of the carapace. All the dactyli end in a little claw.

The abdomen of the male consists of seven distinct segments, but the 3rd, 4th and 5th move together.

In life the animal is covered with a coat of mud held together by the hairs above described, the only bare parts being the hand and fingers and part of the arm of the larger cheliped of the male.

The colours in life are described by Dr. A. R. Anderson, as "white with a bluish tinge, eyes with a slight reddish opalescence." In spirit the bluish tinge is fainter, the eyes are a pale milky yellow-ochre, and the large hand is ivory-white.

The dimensions of the largest male are as follows:—

Length of carapace ...	...	...	...	18.5 millim.
Breadth of carapace ...	...	...	...	14.5 "
Combined length of hand and fingers, along lower border...				14.75 "
Combined length of basal joints, arm and wrist, along upper border	...	...	...	15 "

Fifteen specimens were dredged off the Travancore coast at a depth of 430 fms. The bottom consisted chiefly of coral (living and dead).

Several of the specimens were egg-laden females. The eggs are comparatively few in number and are large, their diameter being about 1.3 millim.

This species is very like *Trachycarcinus corallinus*, Faxon, which was dredged by the "Albatross" off Panama and the Pacific coast of Mexico, at depths of 546-695 fathoms.

It differs from that species in the following particulars :—

The carapace is more granular, and its lobules are capped by blunt conical spinules, *not* smooth tubercles ; and its posterior border is finely and irregularly beaded, *not* dentate.

The front is deeply cut into 3 spines or prongs of almost equal size, *not* into 3 teeth of which the middle one is larger than the others.

The eyes, though very pale, are distinctly pigmented, *not* devoid of pigment.

The inner angle of the wrist of the smaller cheliped is very strongly spiniform, *not* unarmed.

As Mr. Faxon says, *Trachycarcinus* is very closely related to *Trichopeltarium* ; in fact, the relation is so close as to make the separation of the two forms almost doubtful.

### Family CORYSTIDÆ.

*Corystiens* (part) Milne Edwards, Hist. Nat. Crust. II. 139.

*Corystoidea-Corystidæ* (part) Dana, U. S. Expl. Exp. Crust. pt. I, p. 296.

*Corystoidea* (part) Miers, Challenger Brachyura, p. 210.

*Majoidea-Corystoidea*, Ortmann, Zool. Jahrb., Syst., VII. 1893, pp. 26, 28.

*Oxyrhyncha-Corystidæ*, Ortmann, in Bronn's Thier Reich. V. ii. (Arthropoda), p. 1166.

Carapace much longer than broad, oval, convex from side to side, the regions sometimes fairly well defined, sometimes not, never areolated.

Front fairly prominent, cut into 2 or 3 teeth.

The antennules are small and fold longitudinally.

The antennæ, when present and perfect, usually have the flagellum long coarse and setaceous.

There is no epistome, and the external maxillipeds, which are elongate and sometimes have a slight pediform cast, extend almost up to the antennules. The buccal orifice is elongate and is square cut with the anterior angles rounded and slightly convergent.

Legs either all gressorial or the last pair modified for swimming.

The following genera compose this family :—

I. *Genera in which the legs are not natatory* :—

1. *Bellia*, Milne Edwards, Ann. Sci. Nat. (3) IX. 1848, p. 192.

2. \**Corystes*, Latr., Milne Edwards, Hist. Nat. Crust. II. 146.

3. *Corystoides*, Edwards and Lucas, Voy. Amer. Merid., Crust. p. 31.

4. *Gomezia*, Gray, Zool. Miscell. p. 39, Miers, Challenger Brachyura, p. 212 (= *Oeidia*, De Haan, Faun. Japon. Crust. p. 15).

5. *Podocatactes*, Ortmann, Zool. Jahrb., Syst., VII. 1893, p. 29.

II. *Genera in which the legs are more or less natatory* :—

6. \* *Nautilocorystes*, Milne Edwards, Hist. Nat. Crust. II. 149 (= *Dicera*, De Haan, Faun. Japon. Crust. p. 14).

7. *Pseudocorystes*, Milne Edwards, Hist. Nat. Crust. II. 149.

## NAUTILOCORYSTES, Edw.

*Nautilocorystes*, Milne Edwards, Hist. Nat. Crust. II. 149.

*Dicera*, De Haan, Faun. Japon. Crust. p. 14.

Carapace elongate-obovate, slightly convex from side to side, smooth without distinction of regions, the antero-lateral borders longer than the postero-lateral and armed with five teeth.

Front moderately broad, horizontal, moderately prominent, cut into 2 or 3 teeth.

The antennules fold longitudinally. Antennæ coarse, setaceous, the basal joint occupying the orbital hiatus, the flagellum about half as long as the carapace.

Buccal orifice elongate subquadrate, not defined anteriorly: external maxillipeds elongate, the merus narrower than the ischium and bearing the flagellum at its summit. Even in repose the external maxillipeds partly conceal the antennules.

Chelipeds short, much more massive than the legs.

Legs compressed, the first 3 pair end in a lanceolate dactylus the last pair end in a blade-like swimming dactylus.

1. *Nautilocorystes investigatoris*, n. sp.

Carapace elongate-obovate covered with a multitude of fine brown longitudinal lines, smooth.

Front about a third the greatest breadth of the carapace, slightly prominent beyond the orbits, cut into 3 teeth.

Antero-lateral borders cut into 5 irregularly disposed teeth including the outer orbital angle.

Inner angle of lower border of orbit acutely dentiform, prominent beyond the level of the front.

Chelipeds equal, about as long as the carapace: a spine at the inner angle of the wrist and two spines on the upper surface of the hand—one being in front of the apex of the wrist-joint the other behind the finger-joint.

Legs compressed, much slenderer but not much shorter than the chelipeds, hairy: the dactylus of the last pair is broadly blade-shaped as in *N. ocellatus*.

In the Indian Museum are 2 females—one with eggs—from the Vizagapatam coast 15–17 fms. The carapace is 6·25 millim. long and 5·5 millim. broad.

This species differs from *N. ocellatus* in the following particulars:—the front is 3-spined, the inner suborbital angle is extremely prominent and spiniform, there are two spines on the hand, and the colour-markings are fine longitudinal lines.

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*Materials for a Carcinological Fauna of India. No. 5. The Brachyura Primigenia, or Dromiacea. By A. ALCOCK, M.B., C.M.Z.S., Superintendent of the Indian Museum.*

[Received 1st September ; Read 1st November, 1899.]

The opinions adopted in this paper are those of BOAS, that the *Dromiacea* are *Brachyura* ; and of BOUVIER, that they connect the higher *Brachyura* with the Homarid family of *Macrura*.

I have endeavoured to show that the *Dromiacea*, or *Brachyura Primigenia*, include two natural groups—*Dromiidea* and *Homolidea*—each of which is a collection of families equivalent to the collections of families recognized as *Catometopa*, *Cyclometopa*, etc. ; but, as is only to be expected in dealing with primitive groups, the families are small.

After raising a family to the rank of a tribe, and splitting it up into several independent families, it may seem inconsistent to unite the recognized genera of other authors, as is done in this paper with the genera *Dromia*, *Dromidia*, *Cryptodromia*, and *Petalomera*, all of which are treated as sub-genera of *Dromia*. But the reason for this treatment is that these are all linked together by intermediate forms.

The Indian species of *Dromiacea* number 28 and belong to the following genera and families :—

DROMIIDEA	{	<b>Homolodromidæ</b> :— <i>Arachnodromia</i> (? = <i>Homolodromia</i> ).
		<b>Dynomeneidæ</b> :— <i>Dynomene</i> , <i>Acanthodromia</i> .
		<b>Dromiidæ</b> :— <i>Dromia</i> ( <i>Dromidia</i> , <i>Cryptodromia</i> , <i>Petalomera</i> ), <i>Pseudodromia</i> , <i>Conchoecetes</i> , <i>Sphaerodromia</i> .

HOMOLIDEA { **Homolidæ**:—*Homola* (*Paromola*, *Homolax*) *Paromolopsis*,  
*Hyposphrys*.  
**Latreillidæ**:—*Latreillopsis*, *Latreillia*.

### DROMIACEA or BRACHYURA PRIMIGENIA.

*Anomoures Dromiens* and *Homoliens*, (part) Milne Edwards, Hist Nat. Crust. II., pp. 168, 180.

*Dromiacea*, De Haan, Faun. Japon. Crust. p. 102.

*Dromidea* vel *Anomoura Maiddica Superiora*, Dana, U.S. Expl. Exp. Crust. pt. 1, p. 400.

*Anomoura Dromidea*, Miers, Cat. Crust. New Zealand, p. 57.

*Dromiacea*, J. E. V. Boas, Recherches sur les affinités des Crustacés décapodes, p. 202.

*Anomoura Dromidea*, Haswell, Cat. Austral. Crust. p. 138.

*Anomura Dromidea*, Henderson, Challenger Reports, Zoology, Vol. XXVI., p. 2.

*Dromiaces* (Études Comparatives des), Bouvier, Bull. Soc. Philomath. Paris, (8) VIII., 1896, pp. 34–108.

*Dromiidea*, Ortmann in Bronn's Thier Reich, V. ii., Arthropoda, p. 1153.

Carapace seldom broader than long, subquadrilateral or subovoid (sometimes sub-circular, or urn-shaped, or sub-pentagonal), often (as also the appendages) pilose. Front narrow.

Orbits and antennular fossæ may either be altogether wanting, or there may be common orbito-antennular fossæ into which the eyes and antennules are both retractile.

The antennal peduncle consists of four separate joints, and the antennal flagellum is long.

The epistome is triangular or truncate-triangular, and is well delimited from the palate.

The buccal cavern is quadrilateral, but is usually broader in front than behind. The external maxillipeds may be pediform, or sub-pediform, or completely opercular.

The last pair of legs are dorsal in position, and, with few exceptions, are prehensile slender and reduced in size, or even sometimes rudimentary. The penultimate pair sometimes resemble the last pair.

The abdomen in both sexes is large, and usually consists of seven separate segments: in the male it has the usual anterior two pairs of modified copulatory appendages: in the female it has the usual four pairs of ovigerous appendages and, in addition, a pair of smaller uniramous appendages situated on the first segment.

The genital ducts of the female open upon the bases of the 2nd pair of legs (third pereopods): those of the male open on the bases of the fourth pair of legs (5th pereopods).

The gills are usually phyllobranchiæ, but may be trichobranchiæ,

or may be intermediate in character. The gill-plumes vary in number from 20 to 8 on either side.

I follow Professor Boas, without hesitation, in placing the *Dromiacea* at the base of the *Brachyura*; and I further think that no one who has access to a good spirit-collection of the two groups in question can read M. E.-L. Bouvier's clever paper, cited above, *Sur l'origine Homarienne des Crabes*, without accepting the opinion of the latter author—an opinion previously suggested, as the author states, by Huxley—that the *Dromiacea* are the directly-connecting link between the Crabs (*Brachyura vera*) and the *Homaridæ*.

The *Dromiacea* may be divided into two groups, which seem to me to have something more than family value, namely, the *Dromiidea* and the *Homolidea*, each of which has retained certain primitive characters while following its own line of evolution.

#### Tribe I. DROMIDEA.

*Dromiens*, Milne Edwards, Hist. Nat. Crust. II. 168.

*Dromidæ*, Henderson, Challenger Anomura, p. 2.

*Dromidæ* et *Dynomenidæ*, Ortmann, in Bronn's Thier Reich, V. ii. Arthropoda, p. 1155.

Carapace sometimes longer than broad, often broader than long, without *linea anomurica*.

Eyes and antennules almost always (*Homolodromia* is the only exception) retractile into common orbito-antennular pits, the lower wall of which is formed about equally (1) by the basal joint of the antennule itself, (2) by the basal joint of the antenna, and (3) by a sub-orbital spine or dentiform lobe.

These orbito-antennular pits very often show traces of a subdivision into two fossæ, one for the antennule the other for the eye—the boundary between the two fossæ often being a tooth or a sort of fold in the upper margin of the "orbit."

Eye of the ordinary form, situated at the end of a short stout eye-stalk, the basal joint of the eye-stalk being inconspicuous.

Epistome triangular, its apex usually being in close contact with the deflexed tip of the front. Vault of the palate of good depth.

External maxillipeds usually opercular, sometimes subpediform.

Fingers of the chelipeds generally short, stout, channelled along their opposed surfaces, and strongly calcified in their distal half.

Sternum of the female traversed longitudinally, in part or in almost all of its extent, by a pair of special grooves that sometimes end in special tubercles.

The abdomen of both sexes consists of seven separate segments. Very often a pair of small lateral plates—the rudiments, probably, of



the 6th pair of abdominal appendages—is intercalated between the 6th and 7th somites.

The gill-plumes vary in number from 20 to 14 on either side, and are either trichobranchiæ or phyllobranchiæ.

Many of the species are protected by a commensal Sponge or Ascidian, or by an empty valve of a Lamellibranch shell, carried over the back.

## Tribe II. HOMOLIDEA.

*Homoliens* (part), Milne Edwards, Hist. Nat. Crust. II. 180.

*Homolidæ*, Henderson, Challenger Anomura, p. 18: Ortmann in Bronn's Thier Reich, V. ii., Arthropoda, p. 1155.

Carapace longer than broad: *linea anomurica*, usually present\*. The eyes are not retractile into orbits, nor the antennules into pits. Basal antennular joint subglobular.

The eye-stalks each consist of two movable joints, a slender conspicuous basal joint which is sometimes of great length, and a stout terminal joint that carries the eye. The antennal flagella are, except in the *Latreillidæ*, much longer than the carapace.

The interantennular septum is a distinct vertical process, and is not formed merely by the close apposition of the apex of the epistome to the front.

The front forms a slender triangular prominent rostrum which may be bifid at tip, and often has a spine on either side of its base.

The division between the epistome and palate is distinct, but the vault of the palate is shallow.

External maxillipeds pediform or sub-operculiform.

The chelipeds and legs are long and slender: the fingers are not channelled *en cuillère*. Only the last pair of legs is dorsal and reduced in size.

Sternum of the female broad, without any special longitudinal grooves.

The abdomen of the male, and usually but not always of the female also, consists of seven separate segments. There are no lateral platelets intercalated between the 6th and 7th segments.

The gills are phyllobranchiæ, and the gill-plumes vary in number from 14 to 8 on either side.

\* The *linea anomurica* is a curious suture-line running fore and aft on either side from the posterior border of the carapace to the inner side of the antennal spine. For its homologue among the nearer relatives of the Homolidea we have to go to certain species of *Peneus*.

In comparing the above synopses of characters it will be seen that the *Dromidea* as a whole have developed along Brachyurous lines in respect of the antennal flagella, orbits, external maxillipeds, and shape of the carapace, but have kept near to the primitive (Homarid) branchial arrangements. Whereas the *Homolidea* as a whole show a tendency to approach the higher Brachyura in the reduction of the branchiæ, but have not departed much from the primitive (Homarid) type in the form of the antennal flagella, external maxillipeds and very imperfect orbits.

### Tribe I. DROMIIDEA.

The *Dromiidea* which, notwithstanding the more Brachyurous form of the carapace of their best known representatives, are as a whole more primitive than the *Homolidea* may be divided into three families—*Homolodromidæ*, *Dynomenidæ* and *Dromidæ*—characterized as follows:—

#### Family I. HOMOLODROMIDÆ.

Carapace longer than broad, convex in both directions, the true cervical and the branchial grooves both present.

Front cut into two prominent teeth, between which, but on a much lower plane, a third small tooth is *sometimes* present.

Antennal flagella longer than the carapace.

External maxillipeds with a marked pediform cast.

Chelipeds equal, slender, though stouter than the legs.

First two pair of legs much longer than the chelipeds: last two pair much shorter than the first two pair, subdorsal, prehensile.

The abdomen in both sexes consists of 7 separate segments: there are no lateral platelets intercalated between the 6th and 7th segments.

The gills are trichobranchiæ, or are intermediate between trichobranchiæ and phyllobranchiæ: the gill-plumes are very numerous—there may be as many as 20 on either side.

Epipodites are present on the chelipeds and first two or three pairs of legs.

The sternal grooves of the female are short, ending at the level of the genital openings.

To this family belong the following genera:—

1. *Homolodromia*, A. Milne Edwards, Bull. Mus. Comp. Zool., VIII. 1880, p. 33: Recueil de Fig. de Crustacés Nouveaux, pl. 39, fig. 2.
2. *Dicranodromia*, A. Milne Edwards, Bull. Mus. Comp. Zool., VIII. 1880, p. 31: Recueil de Fig. de Crust. Nouv. pl. 10.
3. \**Arachnodromia*, Alcock, *seq.*

#### Family II. DYNOMENIDÆ, Ortmann.

*Dynomenidæ*, Ortmann in Bronn's Thier Reich, V. ii., Arthropoda, p. 1155.

Carapace variable, either longer than broad and convex, or broader

than long and flattish. Branchial groove usually present, cervical groove sometimes present.

Front broadly triangular, sometimes notched at tip. Antennal flagella not so long as the carapace.

External maxillipeds typically opercular, completely closing the buccal cavern.

Chelipeds equal or slightly unequal, generally much stouter than the legs.

First three pair of legs stout, about as long as the chelipeds. Fourth (last) pair of legs dorsal and rudimentary.

The abdomen in both sexes consists of 7 segments, and there is a pair of lateral platelets intercalated between the last two segments.

The gills are phyllobranchiæ but sometimes show the transition from tricho- to phyllobranchiæ. The gill-plumes are 16 (?) on either side.

Epipodites are present on the chelipeds and first three pair of legs.

Sternal grooves of the female ending at the level of the genital openings.

To this family belong (1) *Dynomene* and (2) *Acanthodromia*, both of which are represented in Indian Seas.

### Family III. *DROMIDÆ*, *restr.*

Carapace variable, sometimes as long as or even a little longer than broad, sometimes slightly broader than long; generally strongly convex in both directions, sometimes flat; commonly ovoid or subcircular, occasionally pentagonal.

\* Branchial groove almost always conspicuous, the true cervical groove present or absent on the dorsum of the carapace.

Front usually cut into 3 teeth, the middle one of which is always on a much lower plane than the others and is often of insignificant size or even absent: the front is rarely triangular, without lateral teeth. Antennal flagella shorter than the carapace.

External maxillipeds typically opercular, completely closing the buccal cavern.

Chelipeds equal, generally much stouter than the legs.

First two pair of legs generally stout, not much shorter than the chelipeds.

Last two pair of legs generally much reduced in length and slender, subdorsal and prehensile. There is a tendency for the fourth (last)

\* The branchial groove of Bonvier, which by most authors is called the "cervical" groove.

pair to be a little longer than the third pair, and occasionally the fourth pair are as long as either of the first two pair.

The abdomen in both sexes consists of 7 segments, and there is a pair of lateral platelets intercalated between the last two segments.

The gills are phyllobranchiæ and are 14 in number on either side.†

An epipodite of small size is present on the chelipeds but not on any of the legs.†

The sternal grooves of the female are variable: they may end at the level of the genital openings, or at the bases of the first pair of legs, or at the bases of the chelipeds.

To this Family the following genera belong:—

1. \**Dromia*, Fabr. : *seq.*
2. \**Dromidia*, Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 225 (subgenus of *Dromia*).
3. \**Cryptodromia*, Stimpson : *seq.* (subgenus of *Dromia*).
4. \**Petalomera*, Stimpson : *seq.* (subgenus of *Dromia*).
5. \**Pseudodromia*, Stimpson : *seq.* (? subgenus of *Dromia*).
6. *Eudromia*, Henderson, Challenger Anomura, p. 13.
7. ???*Ascidiphilus*, Richters, in Mobius, Meeresf. Maurit. p. 158 (it is very doubtful whether this form really belongs to the Dromiacea).
8. \**Conchoecetes*, Stimpson : *seq.*
9. *Hypochoncha*, Guérin, Rev. et Magasin de Zool. (2) VI. 1854, p. 333.
10. \**Sphærodromia*, Alcock, *seq.*

## Tribe II. HOMOLIDEA.

The *Homolidea* may be divided into two families *Homolidæ* and *Latreillidæ*.

To the *Homolidæ* belong (1) *Homola* (with subgenera *Homolax* and *Paromola*), (2) *Paromolopsis* and (3) *Hypsophrys*, all of which are represented in Indian Seas.

To the *Latreillidæ* belong (1) *Latreillia* and (2) *Latreillopsis*, both of which are found in Indian Seas.

I am uncertain of the position of *Homologenus* A. Milne Edwards, which, but for its singular branchial formula, would be placed with the *Homolidæ*. It may perhaps have to be separated as a distinct subfamily of the *Homolidæ*. The references to the literature of this genus are: Bull. Mus. Comp. Zool. VIII., 1880, p. 34, (*Homolopsis* name pre-occupied): Challenger Anomura, p. 20: Bull. Soc. Philom., Paris, (8) VIII., 1896, p. 63: Bronn's Thier Reich V. ii., Arthropoda, p. 1156.

† Huxley (P. Z. S. 1878, p. 785) gave, as the sum of the branchial formula of *Dromia*, gills 16+1 epipodite. Milne Edwards (Hist. Nat. Crust. II. 172) stated that the gills are 14 in number on either side. I have examined *Dromia Rumphii* and *D. ciliata*, *Cryptodromia lateralis*, *Petalomera granulata* and *Conchoecetes artificiosus*, in all of which I find 14 branchiæ and 4 epipodites on either side: of the epipodites, 3 belong to the maxillipeds, and one—a small one—to the chelipeds.

Family I. HOMOLIDÆ *restr.*

Carapace elongate-quadrangular, or ovoid, or urn-shaped.

Terminal joint of the eyestalk (with the eye) either longer or shorter than the slender basal joint. Antennal flagella much longer than the carapace.

External maxillipeds pediform or subpediform.

The gill-plumes are 14 in number on either side, and there are epipodites to the chelipeds and first two pair of legs.

*Homola*, *Paromolopsis* and *Hypsophrys*, *vid. seq.*

## Family II. LATREILLIDÆ.

Carapace elongate-quadrangular, or piriform.

Basal joint of eye-stalk very much longer than the terminal joint.

Antennal flagella not so long as the carapace.

External maxillipeds sub-operculiform.

The gill-plumes are 8 in number on either side and there are no epipodites to the chelipeds or legs.

*Latreillia* and *Latreillopsis*, *vid. seq.*

## Tribe DROMIDEA.

## Family HOMOLODROMIDÆ.

## ARACHNODROMIA, Alcock.

*Arachnodromia*, Alcock, Investigator Deep Sea Brachyura, p. 17.

Carapace elongate-oblong but somewhat broader behind than in front, deep, inflated, tomentose, its texture thin but well calcified: two creases break either lateral border, the posterior one being the more distinct and being continued to the cardiac region (= branchial groove), the anterior one, or true cervical groove, not proceeding far on to the dorsum of the carapace.

The front is horizontal, prominent, and deeply bifid.

The antennule and eye of either side are completely retractile into a common deep fossa (just as in *Dromia*) which affords them complete protection. As in *Dromia*, the floor of this common antennular-orbital fossa is formed by a subocular ("antennal") tooth in contact with the basal joint of the antenna, and, as in *Dromia*, the outer wall of the orbit is breached by a wide gap. The orbital portion of the fossa, which is loosely filled by the eyes, has the hollow for the eyes much deeper than the hollow for the eyestalk. The eyestalks are long and slender, the eyes small but perfectly formed and well pigmented.

The two basal joints of the antennæ, which are quite freely movable, largely fill the gap in the lower wall of the orbit, and lie in the

same plane with the antennules; the second joint has its antero-external angle produced to form a coarsish spine: the antennal flagella are longer than the carapace.

The palate is particularly well demarcated from the epistome and is rather broader in front than behind: the ridges that define the expiratory canals are very distinct. The epistome is in the closest possible contact with the front, but without complete fusion. The external maxillipeds are distinctly operculiform, but owing to the moderate expansion of the merus and to the coarseness of the palp, they have a slight pediform cast: they close the buccal cavern, but not so tightly as in *Dromia*.

The chelipeds are equal and are rather slender, though considerably stouter than the legs: the fingers are well calcified and are hollowed *en cuillère*, the tip of the dactylus shuts into a notch in the tip of the opposed finger.

The legs are cylindrical: the first two pairs are very long, the last two are short, subdorsal in position, and cheliform rather than subcheliform.

The sternal grooves of the female end opposite the openings of the oviducts, without tubercles.

The abdomen of both sexes consists of seven distinct segments. In both sexes the pleuræ of the 3rd-6th abdominal somites are remarkably free and independent (*i.e.* not in contact with those in front and behind) and the last abdominal tergum is nearly as long as the preceding five combined. In the male this last tergum is marked in a way that suggests its formation out of a segment fused with a pair of appendages.

This crustacean, as I have previously remarked, so closely resembles the *Homolodromia* described and figured by Milne Edwards\* and referred to by Bouvier,† that at first sight it might be supposed to be the same form.

In *Homolodromia*, however, it is distinctly stated that the antennules are not retractile, and that there are no special orbits.

In *Arachnodromia*, on the other hand, there are orbits formed on exactly the same plan as, and hardly less perfect than, those of *Dromia*, and they afford complete protection to the retracted eyes and antennules, the antennular flagella folding, as in *Dromia*, behind the eyes.

\* A. Milne Edwards, Bull. Mus. Comp. Zool. Vol. VIII. 1880, p. 32, and Recueil de figures de Crustacés Nouveaux etc. pl. 39, fig. 2. Not the *Homalodromia* of Miers, which ought to be placed with *Pseudodromia*.

† E. L. Bouvier, Bull. Soc. Philom. Paris (8) VIII. 1895-96, p. 37, *et seq.*

The branchial formula is as follows:—

Somites and their appendages.	Podobranchiæ.	Arthrobranchiæ.	Pleurobranchiæ.
VII. ...	0 ep.	0	0 = ep.
VIII. ...	1+ep.	1	0 = 2+ep.
IX. ...	1+ep.	2	0 = 3+ep.
X. ...	1+ep.	2	0 = 3+ep.
XI. ...	1+ep.	2	1 = 4+ep.
XII. ...	1+ep.	2	1 = 4+ep.
XIII. ...	0	2	1 = 3
XIV. ...	0	0	1 = 1
	<hr/>	<hr/>	<hr/>
	5+6 ep.	11	4      20+6 ep.

The formula is thus the same as that given by Bouvier for *Homodromia*.

### 1. *Arachnodromia Baffini*, Alcock and Anderson.

*Arachnodromia Baffini*, Alcock and Anderson, Ann. Mag. Nat. Hist., Jan. 1899, p. 7: Alcock, Investigator Deep Sea Brachyura, p. 19, pl. ii. fig. 1.

Carapace square-cut, dorsally convex, very distinctly (from a fourth to a fifth) longer than broad, its greatest breadth being just in front of the posterior border, its greatest depth approximating its greatest breadth, its surface—like that of the appendages and other parts of the body—tomentose. Except for a few small sharp granules anteriorly and laterally and along the lateral border, the carapace is unarmed.

The front is deeply cleft to its base, and has the form of two acutely triangular teeth.

Upper margin of orbit notched near its outer angle which is dentiform, the outer angle of the lower margin of the orbit is much more strongly dentiform, and the (outer) orbital wall between the two spines is deficient.

Antennal flagella longer than the carapace.

Chelipeds rather slender, unarmed except for a few granules seen on denudation, about  $1\frac{1}{2}$  times the length of the carapace: fingers strongly hollowed '*en cuillère*,' especially the immovable one, which alone has teeth: wrist not elongate.

First two pairs of legs more than twice the length of the carapace: their dactyli are about two-thirds the length of the preceding joint, are stout, are sharply spinate along the posterior edge, and end in a claw. The last two pairs of legs are about the same length as the carapace: their small claw-like dactyli shut down on a ring of spines at the end of the preceding joint.

Colours : dirty whitish, with a bluish tinge on the carapace and a faint reddish tinge elsewhere; eyes chocolate.

Two males and a female, from off the Travancore coast, 430 fms. : a small male from the Andamans, 238–290 fms.

The carapace of the largest male is 20 millim. long and 15 millim. broad, that of the female is 30 millim. long and 24 millim. broad.

Named in memory of the great Arctic explorer William Baffin, who, according to Sir Clements Markham, was the first Englishman to actually plot charts in these Seas.

### Family DYNOMENIDÆ.

This family includes two genera which may be thus diagnosed :—

- I. Carapace flattish, broader than long,  
covered with hairs ..... DYNOMENE.
- II. Carapace convex, longer than broad,  
covered with spines or spinules ..... ACANTHODROMIA.

#### DYNOMENE, Latreille.

*Dynomene*, Latreille in Cuvier's Règne An. (nou. ed. 1829) p. 69 : Desmarest, Consid. Gen. Crust. p. 133 : Milne Edwards, Hist. Nat. Crust. II., 179 : Lamarck, Hist. Nat. Anim. sans Vert. (2nd ed.) p. 482 : De Haan, Faun. Japon. Crust. p. 104 : Dana, U. S. Expl. Exp. Crust. pt. I. p. 402 : A. Milne Edwards, Ann. Sci. Nat. Zool., (6) VIII. 1879, Art. 3 : Ortmann in Bronn's Thier Reich, V. ii., Arthropoda, p. 1155.

All parts usually tomentose.

Carapace subcircular, flattish, broader than long.

Front broadly triangular, dorsally grooved, more or less distinctly notched or divided at tip.

Palate well delimited from epistome : efferent branchial channels well defined.

The chelipeds usually do not differ greatly in size from the first 3 pair of legs : these are stout and of about equal length.

The 4th (last) pair of legs are quite rudimentary and alone are dorsal in position.

As regards the branchial formula, according to Bouvier it follows the *Dicranodromia* and *Homolodromia* type.\*

*Distribution* : Tropical Indo-Pacific, from Madagascar to California.

#### 2. *Dynomene pilumnoides*, n. sp.

The carapace and appendages are covered with an exceedingly thick tomentum of club-shaped hairs, the chelipeds and legs are also

\* The material at my disposal, at present, does not permit me to indulge in dissection ; but I have been able to make out that the branchial plumes and epipodites are more numerous than they are in *Dromia*, *Cryptodromia*, &c.



thickly fringed with additional longer hairs. The hairs completely conceal all the texture and sculpture beneath them.

Carapace subcircular, slightly broader than long, flattish. The true cervical groove is well defined, but the branchial groove is hardly distinguishable.

There are a few very inconspicuous symmetrically-disposed elevations on the gastric and on the anterior part of the branchial regions.

Front broadly-triangular, deeply grooved in the middle line. Upper border of orbit oblique, with a fold or notch (best visible from inside the orbit) marking the equivalent of the inner supra-orbital angle of the higher Brachyura. Outer orbital angle not dentiform. Suborbital lobe neither dentiform nor prominent.

Lateral borders of carapace with 5 spine-like teeth, the last of which is much the smallest and stands at the branchial groove.

Chelipeds in the male a little unequal, the smaller one not stouter and not quite so long as, the larger one a little stouter and about as long as, the first 3 pair of legs.

When the chelipeds and legs are denuded their surface is smooth and unsculptured, except that the posterior border of the dactyli of the legs is serrated.

The fourth (last) pair of legs are small slender rudiments, not a fourth the length of the 3rd pair.

A single male from off the Laccadives, 50 to 30 fathoms. Its carapace is 10 millim. long and a little over 11 millim. broad.

The smoothness of the carapace, chelipeds, and legs, and the inequality of the chelipeds distinguish this species from *D. hispida*, of which, however, it may prove to be only a variety.

#### ACANTHODROMIA, A. Milne Edwards.

*Acanthodromia*, A. Milne Edwards, Bull. Mus. Comp. Zool., VIII. 1880, p. 31 : E. L. Bouvier, Bull. Soc. Philomath. Paris, (8) VIII. 1895-96, pp. 56, 57 : Ortmann in Bronn's Thier Reich, V. ii., Arthropoda, p. 1155.

Differs from *Dynomene* in having the carapace longer than broad, convex, and closely covered with spines instead of hairs.

*Distribution* : Caribbean Sea, Andaman Sea.

#### 3. *Acanthodromia margarita*, Alcock.

*Dynomene margarita*, Alcock, Investigator Deep-Sea Brachyura, p. 19, pl. ii. fig. 3.

The whole carapace and dorsal surfaces of the chelipeds and legs are as closely as possible covered with spines and spinules : the under surfaces of the body and legs, the eye-stalks, antennæ, and external maxillipeds are closely and crisply granular.

On the middle of the fourth abdominal tergum is a pair of large smooth tubercles, exactly like pearls, in the closest contact with one another.

Carapace sub-cylindrical, longer than broad; the regions hardly indicated, though the branchial groove is fairly plain.

Front triangular, deflexed, dorsally concave; its apex is in close contact with that of the epistome, and is surmounted by a horizontal spine similar to the larger spines of the surface of the carapace. Supra-orbital borders tumid.

Antennal flagellum nearly as long as the carapace.

Chelipeds equal, a little longer and stouter than the first three pair of legs, and not much longer than the carapace. The fingers are short and stout, and meet throughout their extent.

The last pair of legs are slender rudiments, hardly longer than the basal joints of the other legs.

Colours in spirit, milk-white; eyes deeply pigmented.

A single small male from the Andaman Sea, 75 fathoms. The length of its carapace is 5 millim.

### Family III. DROMIIDÆ.

#### *Key to the Indian Genera and Sub-genera of Dromiidæ.*

- I. Front much as in *Dynomene*, broadly triangular, dorsally grooved, notched at tip. The sternal grooves of the female do not quite reach to the level of the genital openings on the 2nd pair of legs (third pereopods) ... SPHÆRODROMIA.
- II. Front usually cut into 3, sometimes into 2, teeth, rarely entire and triangular. The sternal grooves of the female reach at least as far as the level of the bases of the 1st pair of legs (2nd pereopods):—
  1. Third pair of legs, though shorter, not less stout than the first two pair; ending in a huge talon-like dactylus: fourth (last) pair of legs short and very slender. Carapace flat and pentagonal ... CONCHOECETES.
  2. Third pair of legs similar to, though sometimes shorter than, the fourth (last) pair. Carapace usually convex:—
    - i. Fourth (last) pair of legs shorter than the first two pair:—
      - a. Legs smooth, the meropodites not specially dilated ... DROMIA & DROMIDIA.
      - b. Legs nodular, the meropodites not specially dilated ... CRYPTODROMIA.
      - c. Legs nodular; the meropodites of the chelipeds and first or first two pair of legs dilated, petal-like ... PETALOMERA.

- ii. Fourth (last) pair of legs at least as long as  
either of the first two pair ... PSEUDODROMIA.

*Sphærodromia* and *Conchoecetes*, and doubtfully also *Pseudodromia*, are to be looked upon as distinct genera. But there are undoubtedly forms that are transitional between *Dromia* and *Dromidia*, *Dromia* and *Cryptodromia*, and *Cryptodromia* and *Petalomera*, and even between *Dromia* and *Pseudodromia*, so that these ought not, in a natural system, to be separated, though for convenience they may stand as subgenera.

### DROMIA, Fabr.

*Dromia*, Fabricius, Ent. Syst. Suppl. p. 359: Latreille, Hist. Nat. Crust. &c., V. p. 383, and Nouv. Dict. Hist. Nat. IX. p. 583: Leach, Malac. Pod. Britt. Text of pl. xxiv A: Risso, Hist. Nat. Crust. Nice, p. 15, and Hist. Nat. Europ. Mérid. V. p. 32: Desmarest, Consid. Gen. Crust. p. 136: Milne Edwards, Hist. Nat. Crust. II. p. 170: Lamarck, Hist. Nat. Anim. sans Verteb. (2nd ed. 1838) V. p. 480: De Haan, Faun. Japon. Crust. p. 104: Dana, U. S. Expl. Expd. Crust. pt. I. p. 402: Stimpson, Proc. Acad. Nat. Sci. Philad. 1858, p. 226: Henderson, Challenger Anomura, p. 3: Ortmann in Bronn's Thier-Reich, V. ii. Arthropoda, p. 1155.

All parts except the tips of the fingers and of the dactyli are, generally, tomentose.

Carapace not elongate in the adult, strongly convex or subglobose.

Front cut into three teeth, of which the middle one is on a lower plane than the others and is often so much smaller than them and so much deflexed as to be hardly visible from a dorsal view.

Palate well delimited from the epistome: efferent branchial channels well defined, but not always bounded by distinct and unbroken ridges.

The chelipeds may have some of the joints nodose, but the legs are smooth.

None of the legs have the merus dilated. The last two pair of legs are distinctly subcheliform, the spine at the end of the propodite against which the dactylus closes being well developed.

The sternal grooves of the female do not meet, and they end on the 2nd segment of the sternum, between the 2nd pereopods.

The branchial formula is as follows:—

Somites and their appendages.	Podo-branchiæ.	Arthrobranchiæ.		Pleuro-branchiæ.	
		Anterior.	Posterior.		
VII. ...	ep.	0	0	0	= 0 ep.
VIII. ...	1 + ep.	0	0	0	= 1 + ep.
IX. ...	0 ep.	1	1	0	= 2 + ep.
X. ...	0 ep.	1	1	0	= 2 + ep.
XI. ...	0	1	1 (small)	1	= 3
XII. ...	0	1	1 (small)	1	= 3
XIII. ...	0	1	0	1	= 2
XIV. ...	0	0	0	1	= 1
Total ...	1 + 4 ep.	5	4	4	14 + 4 ep.

*Key to the Indian species of the genus Dromia.*

- I. Carapace, in the adult, broader than long: front cut into 3 teeth of nearly equal size, of which the middle one is slightly the most prominent: third (penultimate) pair of legs hardly shorter than the fourth (last); no large spine at the far end of the posterior border of the propodite of the fourth (last) pair *D. rumphii*.
- II. Carapace, in the adult, at least as long as broad: front cut into 3 teeth, of which the middle one is so small and so much deflexed as to be almost invisible in a dorsal view: third pair of legs very markedly shorter than the fourth; a spine at the far end of the posterior border of the propodite of the fourth (last) pair quite as long as that at the same end of the anterior border:—
  1. True antero-lateral border of the carapace with 3 or 4 spines ... .. *D. cranioides*.
  2. True antero-lateral border of the carapace entire ... *D. unidentata*.

4. *Dromia Rumphii*, Fabr.

*Cancer lanosus*, Rumph, Amboin. Rariteitk. p. 19. pl. xi. fig. 1: Seba, Thesaurus, III. pl. xviii. fig. 1.

*Dromia Rumphii*, Fabricius, Ent. Syst. Suppl. p. 360: Milne Edwards, Hist. Nat. Crust. II. 174: De Haan, Faun. Japon. Crust. p. 107, pl. xxxii: Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 240: Tozzetti, "Magenta" Crust., p. 207: Hilgendorf MB. Ak. Berl. 1878, p. 812: Miers, Ann. Mag. Nat. Hist. (5) V. 1880, p. 370: Walker, Journ. Linn. Soc. Zool., XX. 1886-1890, p. 111: Ortmann, Zool. Jahrb. Syst. &c., VI. 1892, p. 548: J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 406.

All parts, except the tips of the fingers and dactyli thickly covered with a harsh tomentum, with sometimes scattered tufts of longer hair on the carapace.

Carapace in adults broader than long, strongly convex, smooth; the cardiac region and the branchial or "cervical" groove on either side of it plainly marked, the gastric region faintly indicated.

Front cut into 3 nearly horizontal teeth of nearly equal size, the middle one on a lower plane and slightly the most prominent.

In young specimens a projection of the upper edge of the "orbit" marks the position of the true inner supra-orbital angle of the higher *Brachyura*, but in large specimens this is obsolete.

The true antero-lateral borders of the carapace are cut into 3 sharp but coarsish spines, the 2nd of which often has a small secondary denticle at its base. In addition there is a spine on the summit of the infra-orbital lobule, and another at the outer angle of the buccal cavern.

The postero-lateral borders are convergent and have one large coarse spine, placed immediately behind the cervical groove.

The borders of the arm are dentate, especially the upper border, and there are 2 or 3 teeth at the distal end of the upper border of the

wrist and also along the upper border of the hand: all these dentations tend to disappear with age, but two tubercles at the distal end of the outer surface of the wrist are persistent.

The last two pair of legs are about equal in length, being hardly half as long as either of the first two pair: their propodites are much shortened and their dactyli are claw-like, forming chelæ with the opposing spines at the end of the propodites.

Abdomen of male with a broad convex ridge down the middle line.

Sternal tubercles of female very prominent.

In the Indian Museum are specimens from the Persian Gulf, Malabar coast (28 to 49 fms.), Ceylon, Coromandel coast, Orissa coast (25 fms.) and Gulf of Martaban (67 fms.)—also 2 from Mauritius.

The largest specimen, from Mauritius, is  $5\frac{3}{4}$  inches across the carapace.

*Distribution*: Indo-Pacific Seas from the Red Sea, Mozambique, and Mauritius, to Japan.

#### 5. *Dromia cranioides*, de Man.

*Dromidia cranioides*, de Man, Journ. Linn. Soc. Zool., XXII., 1887-88, p. 208, pl. xiv. figs. 6-8.

Carapace etc. tomentose. Carapace globose, a little longer than broad, perfectly smooth except for the "cervical" groove and for two small faint elevations side by side just behind the front.

Front cut into 3 teeth, the middle one of which is so small and on a plane so much lower than the others that it is hardly seen in a dorsal view.

A strongly marked acuminate tooth near the middle of the upper border of the orbit is equivalent to the inner supra-orbital angle of higher Brachyura. Sub-orbital lobe dentiform, very prominent. Outer orbital angle well defined, dentiform.

True antero-lateral borders of the carapace cut into 3 or 4 teeth; when 4, it is by intercalation of a little tooth close to the base of the 1st. A tooth, but not a strongly pronounced one, at the outer angle of the buccal cavern.

Postero-lateral borders slightly convergent, with one tooth placed immediately behind the branchial or "cervical" groove.

Borders of arm granular or obtusely denticulate, as also are the upper border of the wrist and of the hand: two tubercles at the distal end of the outer surface of the wrist.

The last two pair of legs have a claw-like dactylus which meets, in a cheliform manner, a spine at the end of the corresponding propodite.

The last pair are much longer than the last pair but one, being, in fact, very little shorter than either of the first two pair.

Abdomen as in *D. Rumphii*.

The sternal grooves of the female approach one another closely, but do not actually meet, on the 2nd segment of the sternum, near the anterior end of which they terminate, without tubercles.

In the Indian Museum are 5 females and 2 males, from the Andamans and Mergui.

The length of the carapace of the largest specimen is 28 millim.

This species may perhaps turn out to be identical with *Dromia indica* Gray (Zool. Miscell., p. 40).

## 6. *Dromia unidentata*, Rüppell.

*Dromia unidentata*, Rüppell, 24 Krabben roth. Meer., p. 16, pl. iv. fig. 2, pl. vi. fig. 9: Milne Edwards, Hist. Nat. Crust. II. 178: A Milne Edwards, Nouv. Archiv. du Mus. IV. 1868, p. 72: Hilgendorf, MB. Ak. Berl. 1878, p. 813: Müller, Verh. Nat. Ges. Basel. VIII. 1886, p. 472.

*Dromidia unidentata*, Kossmann, Reise roth. Meer. Crust. p. 67: de Man, Jouru. Linn. Soc. Zool. XXII. 1887-88, p. 207, pl. xiv. figs. 4-5: Cano, Boll. Soc. Nat. Napol. III. 1889, p. 255: Henderson, Trans. Linn. Soc. Zool., (2) V. 1893, p. 405: Ortmann, in Semon's Zool. Forschungsr. (Jena. Denkschr. VIII) Crust. p. 34.

Carapace etc. densely tomentose. Carapace about as long as broad, strongly convex, with some dimples when denuded, two of which, separating the post-gastric from the branchial regions, are specially conspicuous. "Cervical" groove well marked.

Front cut into two broadish but sharp teeth, between which, but on a very much lower plane, is an extremely inconspicuous denticle.

A broad tooth ("internal supra-orbital angle") near the middle of the upper border of the orbit. Outer orbital angle prominent but not dentiform. Suborbital lobe bluntly dentiform, but not prominent.

Antero-lateral borders entire, rather sharp. A slight projection, hardly amounting to a tooth, on the postero-lateral border, immediately behind the branchial or "cervical" groove.

Chelipeds smooth, except for two tubercles at the far end of the outer surface of the wrist.

The fourth (last) pair of legs are not so very much shorter than either of the first two pair and are very much longer than the 3rd pair. The propodites of the last two pair are much broader than long and are very spiny, one of the spines in the case of the last pair being as least as long as the spine against which the claw-like dactylus closes—so much so, that the last pair of legs appear to end in 3 claw-like spines the middle one being the dactylus.

The abdomen of the male, when denuded, has a broad convex ridge down the middle line; but when not denuded, the terminal segments of the male abdomen form with the basal joints of the chelipeds and first two pair of legs a remarkably flat surface, owing to the abrupt angular bending up of the last three abdominal segments.

The sternal grooves of the female approach one another closely, but do not actually meet, on the second segment of the sternum, near the anterior end of which they terminate, but without tubercles.

In the Indian Museum are 4 males and an egg-laden female, from Mergui, Port Blair, and the Persian Gulf.

The carapace of the largest specimen is 24 millim. long.

In one of the male specimens, in which the vasa deferentia are, as usual, wonderfully prominent, there are also openings in the basal joints of the 2nd pair of legs (3rd pereopods) corresponding with the genital openings of the female.

*Distribution:* Red Sea and East coast of Africa, Persian Gulf, Ceylon, Coromandel coast, Andaman Sea, Malay Archipelago.

#### Subgenus DROMIDIA, Stimpson.

*Dromidia*, Stimpson, Proc. Ac. Nat. Sci. Philad., 1858, p. 225: Henderson, Challenger Anomura, p. 12: Ortmann in Bronn's Thier Reich, V. ii. Arthropoda, p. 1155.

*Dromidia* is stated to differ from *Dromia* in having (1) the efferent branchial channels defined each by a distinct ridge, and (2) the sternal grooves of the female produced to, and approximated together on, the segment bearing the chelipeds.

Neither of these characters is sufficiently definite to be of generic value, and I do not think that they are enough to justify even sub-generic recognition.

Henderson (Trans. Linn. Soc., Zool. (2) V. 1893, p. 406) includes *Dromia* (*Dromidia*) *australiensis* Haswell in the Indian Fauna, basing his identification on de Man's figure (Archiv. für Naturges. LIII. 1887, i. pl. xvii. fig. 6.) But as that figure does not seem to me to correspond unequivocally with Haswell's description (Proc. Linn. Soc., N. S. Wales, VI. 1882, p. 755, and Cat. Austral. Crust. p. 139), it is sufficient for present purposes to quote these references.

#### Subgenus CRYPTODROMIA, Stimpson.

*Cryptodromia*, Stimpson, Proc. Ac. Nat. Sci. Philad., 1858, p. 225: Miers, Cat. Crust. New Zealand, p. 57: Haswell, Cat. Austral. Crust., p. 188: Henderson, Challenger Anomura, p. 5: Ortmann in Bronn's Thier Reich, V. ii. Arthropoda, p. 1155.

*Epidromia*, Kossmann, Reise roth-Meer., Crust., p. 69.

Differs from *Dromia* only in the following particulars :—

The tomentum when present is much shorter and more velvet-like. The legs, or at least the first two pairs of them, are nodular, as well as the chelipeds. According to Bouvier and Ortmann the chelipeds are without an epipodite; but in *C. lateralis* this is not the case, and a small epipodite is present. The ridges that define the efferent branchial channels are distinct and unbroken.

The species are all small.

### *Key to the Indian species of Cryptodromia.*

#### I. Carapace smooth (non-granular) :—

##### 1. No spines on dorsal surface of carapace :—

i. Front cut into 3 teeth, all of which are plainly visible in a dorsal view : antero-lateral borders of carapace with more than one tooth : legs nodular :—

a. Antero-lateral borders with 3 teeth (not including the outer orbital angle and some teeth on the subhepatic region) ... .. *C. tuberculata*.

b. Antero-lateral borders with 2 teeth (not including the outer orbital angle, etc.) :—

a. Regions of carapace well defined : no tubercle on the surface of the maxillipeds... .. *C. canaliculata*.

β. A pearl-like tubercle in the middle of the exposed surface of the merus of the external maxillipeds ... .. *C. bullifera*.

ii. Front cut into 3 teeth, the middle one of which is hardly seen in a dorsal view : antero-lateral borders of carapace with a single tooth, at their anterior end : legs hardly nodular ... .. *C. hilgendorfi*.

2. A dorsal spine on the hepatic region of the carapace, just behind the outer orbital angle ... .. *C. de Manii*

#### II. Carapace (and appendages also) profusely granular : the regions of the carapace well defined and areolated :—

1. Carapace subcircular in outline, its antero-lateral borders entire ... .. *C. ebaloides*.

2. Carapace pentagonal in outline, its antero-lateral borders dentate ... .. *C. Gilesii*.

#### 7. *Dromia (Cryptodromia) tuberculata*, Stimpson.

*Cryptodromia tuberculata*, Stimpson, Proc. Ac. Nat. Sci., Philad. 1858, p. 239 : de Man, Archiv. f. Naturges. LIII. 1887, i. p. 401.

Var. *pileifera*, nov.

Carapace etc. covered with a short scurfy tomentum which does not conceal the underlying texture.



Carapace broader than long, convex, smooth, without distinction of regions: the cervical groove broad, shallow.

Front cut into 3 broad triangular teeth of about equal size, the middle one of which is on a lower plane than the others and is deflexed.

A sharp tooth near the middle of the upper border of the orbit marks the true inner supra-orbital angle. Outer orbital angle dentiform. Suborbital lobe dentiform and very prominent.

True antero-lateral border cut into 3 or 4 blunt teeth: in the gap between the 1st tooth and the outer orbital angle two subhepatic teeth—one of which is large—show up and, from a dorsal view, look as if they belonged to the antero-lateral border: there are two similar teeth, one alone of which is conspicuous, at the outer angle of the buccal cavern.

On the postero-lateral border, at the branchial or "cervical" groove, is a denticle.

Wrist and palm, and corresponding joints of first two pair of legs, sharply and profusely nodular or tubercular on the outer surface: fingers compressed.

The third pair of legs, though much slenderer and less nodular than the first two pair and only about half their length, are fashioned on much the same plan, except that the propodite is much shortened: the spinule at the end of the propodite of this pair is not big enough to form a chela with the claw-like dactylus.

Last (4th) pair of legs slender and smooth, hardly a dactylus length shorter than the 2nd pair: their propodite has spines at the end of both borders, the spine at the end of the anterior border being large enough to form a chela with the dactylus.

Abdomen of the male slightly convex along the middle line, the 4th and 5th terga with some little nodules: in the female the 3rd–5th terga have the surface a little uneven, but not distinctly nodular.

Every specimen has a commensal sponge which covers it completely like a cap.

In the Indian Museum are 70 specimens from the Andaman reefs.

The carapace of a large egg-laden female is 9 millim. long and 11 millim. broad.

### 8. ? *Dromia* (*Cryptodromia*) *canaliculata*, Stimpson.

? *Cryptodromia canaliculata*, Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 240: de Man, Archiv. f. Naturges. LIII. 1887, i. p. 402 (*et synonym.*): Ortmann, Zool. Jahrb., Syst. etc. VI. 1892, p. 545.

*Dromia tomentosa*, Heller, SB. Ak. Wien, XLIV. 1861, p. 241: *Cryptodromia tomentosa*, Hilgendorf, MB. Ak. Berl. 1878, p. 813, pl. ii. figs. 3–5: Kossmann, Reise roth. Meer. Crust. p. 68.

? *Cryptodromia pentagonalis*, Hilgendorf, MB. Ak. Berl., p. 814, pl. ii. figs. 1-2: Henderson, Trans. Linn. Soc. Zool. (2) V. 1893, p. 406.

Carapace etc. with a short velvet-like tomentum.

Carapace not quite as long as broad, only moderately convex, its surface smooth, its regions very fairly indicated: the "cervical" groove is distinct, the fronto-orbital region is marked off by a shallow transverse groove that runs from one antero-lateral angle of the carapace to the other, and the front itself is longitudinally grooved.

Front cut into 3 broad triangular teeth of nearly equal size, the middle one nearly horizontal, but on a much lower plane than the others, which are somewhat upcurved.

A tooth near the middle of the upper border of the orbit marks the position of the true inner supra-orbital angle. Outer orbital angle dentiform. Infra-orbital lobe dentiform and prominent.

True antero-lateral borders with 2 teeth: in the concave space between the 1st (large) tooth and the outer orbital angle a stout sub-hepatic tooth shows up: below this again is a tooth at the outer angle of the buccal cavern.

On the postero-lateral border, immediately behind the branchial or "cervical" groove, is a tooth.

Outer surface of wrist nodular: a few nodules on upper border of palm: fingers short and stout.

The carpus and propodite of the first 2 pair of legs are nodular.

Last 2 pair of legs short and slender, not nodular, not much more than half the length of the first 2 pair: the 4th (last) pair very little longer than the 3rd. Both end in a strong claw-like dactylus, but are hardly cheliform, although there is a small spine at the end of the propodite of each.

Abdomen of male with a convex ridge down the middle line.

In the Indian Museum are 2 males and a female, from the Andamans and the Persian Gulf.

The carapace of the largest specimen is 14 millim. long.

*Distribution*: Indo-Pacific Seas from the Red Sea and east coast of Africa to Japan.

#### 9. *Dromia (Cryptodromia) bullifera*, n. sp.

Carapace etc. covered with a short tomentum.

Carapace about as long as broad, convex, smooth, "cervical" groove shallow but distinct.

Front cut into 3 acute rather slender teeth, the middle one of which is on a lower plane and is slenderer than the others.

An acute spine near the middle of the upper border of the orbit

marks the position of the true inner supra-orbital angle. Outer orbital angle spiniform. Suborbital lobe dentiform, fairly prominent.

True antero-lateral borders of the carapace cut into 2 teeth, the anterior being much the larger and spine-like. In the gap between the 1st tooth and the outer orbital angle two small smooth subhepatic tubercles are visible, one below the other.

*An elegant pearl-like tubercle below the sub-orbital lobe, a similar but smaller tubercle in the middle of the exposed surface of the merus of the external maxillipeds and another in the middle of the exposed surface of the second joint of the antennal peduncle, are characteristic.*

An extremely inconspicuous denticle on the postero-lateral border, behind the branchial or "cervical" groove.

Outer surface of wrist and upper surface of hand nodular, two of the nodules on the wrist being particularly acute.

Outer surface of carpus and propodite of first 2 pair of legs broken but not nodular.

Last 2 pair of legs slender and very short, ending in claw-like dactyli, but not cheliform.

Abdomen of male convex along the middle line.

One specimen from the Andaman Sea, 490 fathoms, another from off Ceylon, 34 fathoms.

The carapace is between 5 and 6 millim. long.

#### 10. *Dromia* (*Cryptodromia*) *de Manii*, n. sp.

*Cryptodromia* sp. de Man, Journ. Linu. Soc. Zool., XXII., 1888, p. 211.

Carapace etc. tomentose.

Carapace as long as broad, convex, smooth, the "cervical" groove rather indistinct.

Front cut into 3 teeth, the middle one of which is the smallest and is much deflexed.

A tooth near the middle of the upper border of the orbit (true inner supra-orbital angle). Outer orbital angle dentiform.

Suborbital lobe dentiform, but not very prominent.

True antero-lateral border with two blunt teeth: two more blunt teeth on the subhepatic border and one at the angle of the buccal cavern are continued on from the antero-lateral border.

*A tooth on the hepatic region, dorsad of the antero-lateral border, and just behind the outer orbital angle, is characteristic.*

A tiny denticle on the postero-lateral border, just behind the branchial or "cervical" groove.

Outer surface of wrist and upper surface of hand nodular; outer surface of hand granular.

Outer surface of carpus and propodite of first two pair of legs uneven but not distinctly nodular.

Last 2 pair of legs short, ending in claw-like dactyli, not cheliform; the 3rd pair shorter than the 4th.

A single small specimen from Mergui (Anderson collection).

11. *Dromia* (*Cryptodromia*) *Hilgendorfi*, de Man.

*Cryptodromia Hilgendorfi*, de Man, *Archiv. f. Naturges.* LIII. 1887, i. 404, pl. xviii. fig. 3.

Carapace etc. with a short velvet-like tomentum.

Carapace longer than broad, convex, smooth, without distinction of regions. "Cervical" groove broad and shallow.

Front cut into 3 teeth, the lateral ones broad and triangular, the middle one so small and deflexed as to be hardly visible in a dorsal view.

There is no distinct tooth in the upper border of the orbit, but only an angular bulge, to mark the position of the inner supra-orbital angle. Outer orbital angle and sub-orbital lobe not dentiform.

The antero-lateral borders of the carapace are smooth and entire, but as they bend sharply inwards towards the orbits their anterior angle forms a forwardly-directed tooth, the space between which and the outer-orbital angle is concave.

A very small prominence on the postero-lateral border, just behind the branchial or "cervical" groove.

The chelipeds and legs have an uneven surface, but are not really nodular, though both the inner and outer angles of the wrist are strongly pronounced.

The last 2 pair of legs are short and slender, the 4th (last) pair being very little longer than the 3rd; both end in stout claw-like dactyli but are not at all cheliform.

The abdomen bends in very sharply from the 4th segment, making the under surface of the body very flat.

In the Indian Museum are a male and a female from the Persian Gulf.

The carapace of the larger of the two is 12 millim. long.

*Distribution*: Indo-Malayan coasts.

12. *Dromia* (*Cryptodromia*) *ebalioides*, n. sp.

Carapace hardly at all tomentose: a few hairs on the borders of some of the leg-joints.

Carapace subcircular with projecting front, convex, *its surface closely and crisply granular*: not only are all its regions very distinct

but they are also areolated, *the individual areolæ being convex, subcircular, and particularly well defined.* The true cervical groove is present, as well as the branchial groove that generally goes by this name.

Front longitudinally grooved, cut into 3 serrulated teeth of which the lateral ones are broadly triangular, while the middle one is narrow and is more prominent than the others.

Upper border of the orbit very oblique, serrulate, devoid of any tooth to mark the inner supra-orbital angle of the higher *Brachyura*. Outer orbital angle and suborbital lobe not prominent.

Lateral borders of carapace serrulate, not toothed, though there may be a small granular bulge in front of, and another behind, the branchial groove.

Legs and chelipeds crisply granular, the chelipeds and first two pair of legs being also nodular.

Last 2 pair of legs very slender, hardly half the length of the first 2 pair, ending in hook-like dactyli, not cheliform.

First four abdominal terga with some symmetrical granular sculpture, the other three granular but not sculptured.

Three specimens, a male and 2 females, from Karáchi: the carapace of the largest is 7 millim. long and 8 millim. broad.

This species, and the one following, show the transition to *Petalomera*, having a granular carapace, on the dorsal surface of which the true cervical groove is as plain as the branchial groove that is commonly called "cervical."

### 13. *Dromia* (*Cryptodromia*) *Gilesii*, n. sp.

Closely related to *D. sculpta*, Haswell.

Carapace etc. without tomentum: a few hairs on some of the leg-joints.

Carapace pentagonal, convex, its greatest length about equal to its greatest breadth, the greater part of its surface covered with vesiculous granules: not only are all the regions very distinct, but they are also areolated—the areolæ however not being so individually convex as they are in *D. ebalioides*. The true cervical groove is present as well as the branchial groove.

Front cut into 3 triangular teeth, of which the middle one is the smallest and is on a lower plane and obliquely deflexed.

Upper orbital border very oblique: a hardly noticeable angulation—not a distinct tooth—marks the true inner supra-orbital angle. Outer orbital angle not pronounced. Suborbital lobe dentiform but inconspicuous.

Antero-lateral borders of the carapace cut into 5 small granular

lobules or tubercles, of which only 2 belong to the true antero-lateral border, the other 3 being on the subhepatic border and at the outer angle of the buccal cavern.

A granular tubercle on the postero-lateral border, just behind the "cervical" groove.

Legs and chelipeds crisply granular, the chelipeds and first 3 pair of legs being also nodular: the nodules on the carpal joints being prominent and acute.

Last 2 pair of legs very slender, hardly half the length of the first 2 pair, ending in hook-like dactyli, not cheliform.

All the abdominal terga are symmetrically sculptured and granular.

In the Indian Museum are 12 specimens, from off the Malabar coast, 29 fathoms.

The carapace of an egg-laden female is 8 millim. long and  $8\frac{1}{2}$  millim. broad.

This species is easily distinguished from *D. ebalioides* (1) by the sharply pentagonal carapace and less-completely isolated areolæ, (2) by the much more prominent front, (3) by the antero-lateral borders being broken by irregular tubercle-like lobules, and (4) by the more abundant sculpture of the abdominal terga: in everything but the form of the meropodites of the chelipeds and first pair of legs it strongly resembles *Petalomera*.

#### Subgenus PETALOMERA, Stimpson.

*Petalomera*, Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 226: Ortmann in Bronn's Thier Reich (*loc. cit.*) p. 1155 (name only).

*Petalomera* closely resembles *Cryptodromia*, especially those species (e.g. *Cryptodromia ebalioides* and *Gilesii*) in which the carapace is granular and has the cervical and branchial grooves both well developed; and, indeed, only differs from *Cryptodromia* in having the upper border of the meropodites of the chelipeds and first, or first two, pair of legs produced to form a crest so high and thin as to give the joint a petaloid shape.

As in *Cryptodromia* the sternal grooves of the female are widely separated, and end on the second segment of the sternum. As in *Cryptodromia lateralis*, there is a small epipodite to the chelipeds.

There can be little doubt that, as Bouvier (Bull. Soc. Philomath. Paris, 1895-96, p. 52) has remarked, *Petalomera* is a form slightly more primitive than *Dromia*.

#### 14. *Dromia* (*Petalomera*) *granulata*, Stimpson.

*Petalomera granulata*, Stimpson, Proc. Acad. Nat. Sci. Philad., 1858, p. 240.

*Petalomera granulata* var. *indica*, nov.

Carapace etc. hardly at all hairy: edges of the legs with some hairs.

Carapace a little longer than broad, convex in both directions, with numerous unevenly distributed vesiculous granules: all the regions are distinct, but are not all equally well defined. The cervical and branchial grooves are both present.

Front dorsally grooved in the middle line, cut into 3 serrulate teeth, of which the lateral ones are large and triangular, while the middle one is small and is on a much lower plane.

Upper border of orbit serrulate: a tooth near its middle marks the true inner supra-orbital angle. Outer orbital angle pronounced but not dentiform. The suborbital lobe forms a granular tubercle or denticle.

Antero-lateral borders of the carapace cut into 3 granular teeth, the first being subhepatic.

Chelipeds very much more massive than the legs: they and the first pair of legs have the merus petaloid, owing chiefly to the thin expanded crest-like upper border of that joint. The merus of the next pair of legs is not petaloid, though its upper border is sharp. In the chelipeds the inner border of the wrist and the upper border of the palm are prominent and, like the upper and outer surfaces of those joints, are granular: there are also two sharp tubercles at the distal end of the outer surface of the wrist.

The first two pair of legs have a few small granules on some of the joints.

The last two pair of legs are slender and end in small claw-like dactyli, which are opposed to a very small spine at the end of the corresponding propodites: the last pair of legs is very slightly longer than the penultimate pair.

In both sexes the abdomen has a convex ridge down the middle line and the 2nd-5th terga have a few scattered granules on their surface.

The largest specimen is slightly over 15 millim. long, and is 15 millim. broad, but in young specimens the carapace is more elongate.

Colours of fresh spirit specimens: yellow with some reddish markings.

In the Indian Museum are 22 specimens, from the Andamans and from off Ceylon 28 and 34 fathoms.

This variety is to be distinguished from *P. granulata* only in not having the merus of the second pair of legs (3rd pereopods) petaloid.

From *P. pulchra* Miers (Zool. H. M. S. "Alert" p. 260, pl. xxvii. fig. A), it differs only in having a tooth on the supra-orbital border,

which border is serrulate not entire; in having small spines opposed to the dactyli—at the end of the propodites of the last two pair of legs; and in being more granular.

### PSEUDODROMIA, Stimpson.

*Pseudodromia*, Stimpson, Proc. Acad. Nat. Sci. Philad. 1858, p. 226: Henderson, Challenger Anomura, p. 15: Ortmann in Bronn's Thier Reich V. ii., Arthropoda, p. 1155.

*Homalodromia*, Miers (*nec* *Homolodromia* A. M. Edw.), Zool. H. M. S. Alert, p. 553.

Differs from *Dromia* in the following particulars:—

The carapace is more elongate: the efferent branchial channels are defined by ridges.

The fourth (last) pair of legs are as long as, or even longer than, the first two pair.

The sternal grooves of the female end in two tubercles placed close together near the bases of the chelipeds.

The front is variable: it may be cut into 3 teeth as in most species of *Dromia*, or may be bilobed, or may consist of a single triangular tooth.

*Distribution*: Cape of Good Hope, Seychelles, Indian Seas.

N. B.—In *Dromia cranioides*, *Dromia unidentata* and *Cryptodromia tuberculata* the last pair of legs are very little shorter than either of the first two pair.

### Key to the Indian species of *Pseudodromia*.

- I. Front cut into 2 teeth, each of which is fused at base with the tooth of the prominent supra-orbital margin; so that the front appears to be formed of two divergent lobes each of which has both its angles acutely produced ... *P. quadricornis*.
- II. Front in the form of a single triangular tooth ... *P. integrifrons*.

### 15. *Pseudodromia quadricornis*, n. sp. ?

Perhaps identical with "*Homalodromia*" *Coppingeri*, Miers, *loc. cit.* pl. L. fig. B.

Carapace etc. tomentose: a line of peculiarly long silky hairs forms a fringe or false anterior border to the carapace, behind the deflexed front.

Front deflexed, dorsally grooved in the middle line, cut into two broad teeth, each of which is fused at base with a broad supra-orbital tooth; so that the front appears to consist of two large lobes, each of which has its anterior edge concave and its antero-lateral angles acutely produced.

Carapace in the adult longer than broad. slightly convex from side



to side, almost flat fore and aft behind the line of long hairs that marks the frontal declivity: its surface, when denuded, is quite smooth: only the branchial or "cervical" groove and the cardiac region are distinctly marked.

Lateral borders of carapace entire, except that there may be a tiny denticle behind the branchial groove.

Outer orbital angle dentiform. Sub-orbital lobe dentiform, deflexed.

Chelipeds and legs comparatively slender, the chelipeds shorter and hardly stouter than the legs. Two acute tubercles on the outer surface of the wrist.

Fourth (last) pair of legs little slenderer and about as long as either of the first two pair, ending in a slender claw-like dactylus to which a spinule at the end of the propodite is opposed.

Third pair of legs not less stout than, but only about half the length of, the first two pair; ending in a claw-like dactylus.

Length of carapace of an adult female 7 millim., greatest breadth—in front of the branchial groove—6 millim.

Five specimens, representing adults of both sexes, from off Ceylon 34 fathoms, and from the Pedro Shoal (off Malabar coast) 20 fathoms.

#### 16. *Pseudodromia integrifrons*, Henderson.

*Pseudodromia integrifrons*, Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 406, pl. xxxviii, figs. 7-9.

The front is entire and subacute, without any trace of lateral teeth. No supra-orbital tooth. Outer orbital angle poorly marked. The lower orbital margin is formed simply by the antennal peduncle. Chelipeds without any teeth or tubercles. The carpus of the third pair of legs has a prominent lobe at its distal end, anteriorly. Dactylus of fourth (last) pair of legs straight: its propodite with 3 spinules at its far end.

*Loc.* Tuticorin.

No specimens in the Indian Museum.

#### CONCHÆCETES, Stimpson.

*Conchæcetes*, Stimpson, Proc. Acad. Nat. Sci. Philad. 1858, p. 226: Ortmann in Bronn's Thier Reich, *loc. cit.* (name only).

All parts, except the dactyli and tips of the fingers covered with a close velvet-like tomentum.

Carapace not elongate in the adult, dorsally quite flat, sub-pentagonal in outline.

Front cut into 3 teeth, of which the middle one is on a very much lower plane (and is much smaller) than the others.

Palate well delimited from the epistome. Efferent branchial channels well defined.

Chelipeds in the male much more massive and much longer than any of the legs.

The third pair of legs though shorter are not less massive than the first 2 pair, and end in a powerful talon like dactylus. The fourth (last) pair of legs are short and slender.

The sternal grooves of the female do not meet; they end in tubercles on the second segment of the sternum, between the bases of the 2nd pereopods.

The branchial formula and the number and disposition of the epipodites are exactly the same as in *Dromia Rumphii*.

#### 17. *Conchæcetes artificiosus* (Fabr.).

*Dromia artificiosa*, Fabricius, Ent. Syst. Suppl. p. 360.

*Cancer artificiosus*, Herbst, Krabben, III. iii. 54, pl. lviii. fig. 7.

*Conchæcetes artificiosus*, Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 240: Henderson, Trans. Linn. Soc. Zool. (2) V. 1893, p. 407.

*Dromia conchifera*, Haswell, P. L. S., N. S. Wales, VI. 1881-2, p. 757, and Cat. Austral. Crust. p. 141, pl. iii. fig. 4.

Carapace etc. with a dense short velvety tomentum.

Carapace pentagonal, with the posterior border of the pentagon curved, its dorsal surface quite flat, its greatest length (in the adult) about equal to its greatest breadth, its regions all well defined by grooves, the cervical and branchial furrows both equally well cut. There are sometimes a few granules near the borders of the carapace.

Front cut into 3 teeth with granular edges, the middle tooth being smaller and on a much lower plane than the others.

Upper border of orbit very oblique: a granular spine or tooth marks the true inner supra-orbital angle of higher Brachyura. Outer border of orbit apparently wanting, but on denudation a concave row of granules is found there. Sub-orbital lobe granular and dentiform.

On the lateral borders of the carapace are usually two teeth, one immediately behind the cervical groove, the other immediately behind the branchial groove: one (the posterior) or both of these teeth may be nearly worn away, but usually they are both very distinct. Between the first spine and the orbital tooth is a (sometimes broken) row of granules, and between the same spine and the outer angle of the buccal cavern is a row of granular tubercles: the surface of the subhepatic region between these two rows of granules may, when denuded, be granular or not.

The chelipeds of the adult male are, as in *Petalomera*, much more

massive, compared with the legs, than is usual among the *Dromiidae*: they are also much longer than any of the legs. The outer (exposed) surfaces of all the joints are more or less granular, some of the granules on the palm being very large and visible without denudation: in addition, the upper border of the arm is denticulate, there are 2 coarse tubercles at the far end of the outer surface of the wrist, and 2 on the palm just behind the finger-joint.

The first 3 pair of legs are short, and some of their joints are granular and have a tendency to be nodular, a nodule on the carpus being very constant. Of these legs the 3rd pair ends in a characteristic stout talon-like dactylus the tip of which bends towards a stout lobe at the proximal end of the posterior border of the propodite.

The 4th (last) pair of legs are very slender: they reach to the far end of the carpus of the 3rd pair, and end in a tiny claw-like dactylus.

In both sexes the abdomen has a convexity along the middle line.

This species protects itself with the valve of a Lamellibranch shell, which is held, as in a frame, by the strong hook-like dactyli of the third pair of legs.

In the Indian Museum are 24 specimens, representing both sexes, from the Andamans, from various parts of the Coromandel coast between Tuticorin and the Hooghly Delta, and from off the Indus Delta up to a depth of 62 fathoms. It appears to prefer a muddy bottom. There are also 2 specimens from Hongkong.

Distribution: coasts of India, China, and Australia.

#### 18. *Conchoecetes andamanicus* n. sp. ?

Three small specimens from the Andamans differ from adults in the following particulars:—

The carapace, though not flatter dorsally, is more depressed and therefore much shallower.

The front is cut into 2 triangular teeth, between which is a tiny denticle not visible in a dorsal view.

There is no spine or tooth on the upper border of the orbit.

The antero-lateral borders though granular are thin and overhanging, and are without any traces of spines or teeth behind the cervical and branchial grooves. The subhepatic regions are granular but are not bounded by distinct rows of granules.

Instead of two blunt tubercles behind the finger-joint, there is one large subacute tubercle.

#### SPHERODROMIA, Alcock.

*Spherodromia*, Alcock, Investigator Deep-Sea Brachyura, p. 16.

All parts except the tips of the fingers and of the dactyli are tomentose.

Carapace not elongate, subglobose. Front broadly triangular, somewhat deflexed, dorsally grooved, rather deeply notched at tip (of the *Dynomene*-type).

Palate well delimited from the epistome: efferent branchial channels defined by ridges.

The chelipeds and legs are as in typical *Dromia*, except that the chelipeds are not at all nodose.

The sternal grooves of the female are wide apart and do not reach to the level of the genital openings, exactly resembling those of *Dynomene*.

Though the gills are phyllobranchiæ the individual gill-plates are narrow and thick and are undoubtedly transitional.

#### 19. *Sphærodromia Kendalli*, Alcock & Anderson.

*Dromidia Kendalli*, Alcock & Anderson, J. A. S. B. Vol. LXIII. pt. 2, 1894, p. 175: Illustrations of the Zoology of the Investigator, Crustacea, pl. xxiv. figs. 1, 1a.

*Dromia* (*Sphærodromia*) *Kendalli*, Alcock, Investigator Deep-Sea Brachyura, p. 16.

Carapace etc. covered with a dense, yellowish, velvet-like tomentum.

Carapace sub-circular, globose, smooth except for a few vesiculous granules on the pterygostomian regions and on the posterior part of the sidewall, only the cardiac region and the branchial, or "cervical" groove are marked. [The true cervical groove is not distinguishable on the dorsum of the carapace].

The front consists of two triangular teeth. The upper border of the orbit is oblique, but there is no tooth—only a break, or fold, better visible from below than from above—to mark the true inner supra-orbital angle. The outer angle of the orbit is not defined. The sub-orbital lobe is broadly and bluntly triangular.

Lateral borders of the carapace entire, the antero-lateral borders subcristiform and ending at the sub-orbital lobe.

The external maxillipeds when closed leave a gap between their anterior border and the edge of the epistome.

Vesiculous granules are present on the edges of the arms, on the upper and outer surfaces of the wrists, and everywhere on the hands except on the lower part of the inner surface.

The last two pairs of legs are about equal and are about half as long as the other legs: each ends in a small claw-like dactylus which is opposed to two or three tiny spinules at the end of its propodite.

A single female, with the carapace 18 millim. in diameter from the Bay of Bengal, off Nellore coast, 112 fathoms.

20. *Sphærodromia nuz*, n. sp.

Differs from *Sphærodromia Kendalli* only in the following particulars:—

The carapace though of the same subglobular shape is a little broader than long; and the antero-lateral border, instead of running to the orbital angle, runs down without interruption to the outer angle of the buccal cavern. The surface of the carapace, especially in its antero-lateral parts, is finely granular under a lens. The sub-orbital lobe is neither dentiform nor prominent.

A male and a female from the Gulf of Martaban, 70 fathoms.

The carapace of the female is nearly 10 millim. long and nearly 11 millim. broad.

Tribe HOMOLIDEA.

Family I. HOMOLIDÆ.

*Key to the Indian genera of the Family Homolidæ.*

- I. Carapace ovoid. External maxillipeds quite pediform: terminal joint of the eye-stalk very much longer than the basal joint, which is obsolescent: dactylus of last pair of legs very small, and shutting down on the slightly expanded distal border of the propodite ... ... HYP SOPHYS.
- II. External maxillipeds subpediform, the merus, though not a broad joint, having its outer angle distinctly dilated: terminal joint of the last pair of legs shutting against the posterior border of the propodite:—
  1. Carapace subquadrilateral, or urn-shaped, not depressed; its hepatic spine some distance behind the level of the supra-orbital spine: the terminal joint of the eye-stalk is not always quite as long as the basal joint ... ... HOMOLA.
  2. Carapace urn-shaped, depressed; its hepatic spine almost on the same level as the supra-orbital spine: the terminal joint of the eye-stalk is a little longer than the basal joint ... ... PAROMOLOPSIS.

HOMOLA, Leach.

*Homola*, Leach, Trans. Linn. Soc., Vol. XI. 1815, p. 324, and Zool. Miscell. Vol. II. p. 82, pl. lxxxviii: Latreille, Nouv. Dict. d'Hist. Nat. XV. 1817, p. 277, and in Cuvier's Regne Animal, ed. 1829, p. 67: Desmarest, Consid. Gen. Crust. p. 133: Risso, Hist. Nat. Europ. Merid. Vol. V. pp. 34-35: Roux, Crust. de la Méditerranée text of pl. vii: Milne Edwards, Hist. Nat. Crust. II. 181: deHaan, Faun. Japon. Crust. p. 105: Dana U. S. Expl. Exp. Crust. pt. I. p. 403: Heller, Crust. Sudl.

Europ. p. 148: Henderson, "Challenger" Anomura, p. 18: Ortmann, Zool. Jahrb. Syst. etc. VI. 1892, pp. 540 and 542 and in Bronn's Thier Reich, V. ii. Arthropoda, p. 1156: A. Milne Edwards and Bouvier, "Hirondelle" Brachyures et Anomures (Monaco 1894) p. 60: Alcock, Investigator Deep-Sea Brachyura, p. 6.

Carapace deep, longer than broad, quadrilateral or urn-shaped, with deep vertical sides, the gastric region well demarcated and occupying the anterior half of the carapace, the linea anomurica distinct and dorsal.

Front narrow, forming a rostrum, which is either entire or bifid at tip and has a spine, often of large size, on either side of its base.

The orbits are quite incomplete and do not even conceal the eye-stalks, and the eyes, which project far outside them, are retractile against the sides of the carapace. The eye-stalks are long and are composed of two joints, a slender basal joint, and a swollen terminal joint that carries the eye, the terminal joint (with the eye) being nearly as long as the basal joint.

The epistome is fairly or very distinctly marked off from the palate. The expiratory canals are very well defined. The external maxillipeds are subpediform.

The chelipeds are rather slender and generally somewhat spiny. The legs are long and more or less compressed and spiny, the last pair are subcheliform, but have the propodite dilated near the basal end and never twice the length of the dactylus.

The abdomen of both sexes consists of seven separate segments and is rather broad.

The branchial formula is as follows:—

Somites and their appendages.	Podo- branchiæ.	Arthrobranchiæ.		Pleuro- branchiæ.	
		Anterior.	Posterior.		
VII. ...	0 ep.	0	0	0 =	ep.
VIII. ...	1 + ep.	0	1	0 =	2 + ep.
IX. ...	0 ep.	1	1	0 =	2 + ep.
X. ...	0 ep.	1	1	0 =	2 + ep.
XI. ...	0 ep.	1	1	1 =	3 + ep.
XII. ...	0 ep.	1	1	1 =	3 + ep.
XIII. ...	0	1	0	1 =	2
XIV. ...	0	0	0	0 =	0
	1 + 6 ep.	5	5	3 =	14 + 6 ep.

*Distribution:* West Indies and Atlantic coasts of N. America, Azores and coast of Portugal: Mediterranean: East Indian Seas from Cape Comorin to the Philippines.

In my *Account of the Investigator Deep Sea Brachyura*, I have proposed the following subdivision of the genus *Homola*:—

1. *HOMOLA*. Carapace square-cut, its broadest part being in front, across the middle of the gastric region: the *linea anomurica* rather

inconspicuous, keeping close to the lateral border. Rostrum a non-cylindrical bifid tooth, with a smaller spine on either side of its base. 2nd joint of antenna-peduncle having its antero-external angle produced to form a spine. Palate distinctly delimited from the epistome everywhere except in the middle line. The last pair of legs reach to the end of the carpus of the preceding pair.

TYPES *H. barbata* (Herbst) and *H. andamanica*, Alcock.

HOMOLAX. Carapace urn-shaped, its greatest breadth being behind, across the middle of the branchial regions: the *linea anomurica* conspicuous, running well inside the lateral border. Rostrum as in *Homola*. 2nd joint of antenna-peduncle having its antero-external angle acute, but not spiniform. Palate as well demarcated from the epistome in the middle line as it is elsewhere. The last pair of legs reach beyond the end of the carpus of the preceding pair.

TYPE *H. megalops*, Alcock.

PAROMOLA Wood-Mason. "Carapace decidedly macrurous in form," its greatest breadth being behind: the *linea anomurica* very conspicuous and well inside the lateral border. Rostrum a simple cylindrical spine of large size, flanked on either side by a single spine of equal or greater size. 2nd joint of antenna-peduncle not produced or specially acute at the antero-external angle. Palate everywhere well demarcated from the epistome. The last pair of legs not reaching beyond the end of the merus of the preceding pair.

TYPES *H. cuvieri*, Roux and *H. profundorum*, Alcock.

### Subgenus *Homola*.

#### 21. *Homola andamanica*, Alcock.

*Homola andamanica*, Alcock, Investigator Deep-Sea Brachyura, p. 7: and Illustrations of the Zoology of the Investigator, Crustacea, pl. xl. fig. 1.

This may, very possibly, prove the same as *Homola orientalis* Henderson, though it cannot be quite reconciled with the description, still less with the figure, of that species.

In any case it is probably only a variety of *Homola barbata*, with 3 good specimens of which—representing both sexes—it has been compared. The only differences between it and *H. barbata* are the following:—

The eyes are more reniform. The second spine of the lateral border is just behind the hepatic region. There are spines on the posterior border of the meropodites of all four pairs of walking legs.

Carapace elongate-subquadrilateral, its greatest breadth is across the middle of the gastric region, behind which point its sides are quite straight and vertical: it is well calcified, and, like all other parts except the antennary flagella, is covered with short soft but stiff hairs that are not thick set enough to form a coat of concealment.

Rostrum a depressed grooved tooth, bifid at tip. Four spines on the anterior border of the carapace, namely, one on either side of the rostrum, one at either supra-orbital angle.

Lateral borders of dorsum of carapace straight, very slightly convergent, spinate; the first spine, which stands alone on the hepatic region, is of pre-eminent size, the second though much smaller than the first is much larger than any of the others.

Gastric region very well demarcated, armed with nine large spines—three in a triangle on either median area, one on either lateral area, and one on the hinder part of the central area.

Some spines on the subocular, subhepatic, and pterygostomian regions—largest on the subocular region, where they are definitely arranged in two crescentic rows. Two spines, one *beside* the other, on the carapace outside the antenna-peduncle, in addition to the spinuliform suborbital angle.

Eyes somewhat reniform.

Chelipeds slender, but distinctly stouter than the legs, more hairy than the carapace, especially along the edges of the joints. Upper and lower borders of arm spiny; wrist with rows of spines on the outer surface and a spine or two at the inner angle; lower border of hand spiny, upper border of hand denticulate, cutting edges of fingers sharp, entire.

Legs compressed, their edges plumed with short bristles, with long bristles interspersed. The second and third pair, which are a dactyl-length longer than the first, are not quite  $2\frac{1}{2}$  times the length of the carapace: in all three pairs both edges of the merus are armed with stout spines—at least in the distal half, and the posterior border of the propus and dactylus with compressed articulated spines which are distant and acicular on the propus but stout very regular and close-set on the dactylus.

The subcheliform fourth pair of legs reach very slightly beyond the end of the carpus of the preceding pair: the merus has 3 or 4 spines on the lower border and a terminal spine on the upper border, the claw-like dactylus closes against a bunch of spines on the near end of the propus.

In the Indian Museum are a male and female from the Andaman Sea, 79–90 fathoms; the carapace of the female is about 27 millim. long, and about 21 millim. wide.



Subgenus *Homolax*.22. *Homola megalops*, Alcock.

*Homola megalops*, Alcock, Ann. Mag. Nat. Hist., May 1894, p. 408: Illustrations of the Zoology of the R. I. M. S. 'Investigator,' Crustacea pl. xiv. figs. 1, 1a: Investigator Deep-Sea Brachyura, p. 9.

Carapace urn-shaped, its greatest breadth is across the middle of the branchial region; its sides, and still more the spinulate lateral borders of its dorsum, are elegantly curved; the hairs that cover it are so inconspicuous as to be recognizable only with a lens.

Rostrum a depressed grooved tooth, entire, or emarginate at tip. Four spines on the anterior border of the carapace arranged as in *H. barbata*.

The only enlarged spine of the lateral border stands alone on the hepatic region.

Nine spines on the gastric region—two immediately behind the spines at the base of the rostrum, the other seven in an open S-shaped curve across the middle of the region.

A single row of spines on the subocular region, which region is remarkably hollowed for the reception of the retracted eye. Two spines, one above the other, on the carapace beside the antenna-peduncle, in addition to the bluntly-dentiform suborbital angle.

Eyes reniform, very large, their major diameter being one-sixth the breadth of the carapace.

Chelipeds slender, their arms and wrists distinctly slenderer than the meropodites of the legs: in the adult male they do not reach half-way along the merus of the first pair of legs: they are covered with a short inconspicuous velvet, with hardly any long bristles on the edges of the joints: they are armed much as in *H. barbata*, but the upper border of the hand is spiny and the lower border faintly denticulate. The fingers, which have a sharp entire cutting-edge, are as long as the rest of the hand.

The legs have the surface—especially the dorsal surface—of most of the joints covered with a close short velvet, but have few or no bristles along their edges. The 2nd and 3rd pair, which are nearly a dactylus longer than the first, are nearly three times as long as the carapace: the subcheliform 4th pair reach beyond the end of the carpus of the preceding pair. The first three pair have the anterior edge of their greatly compressed meropodite closely spinate, and the posterior edges of that joint and the ischium closely spinulate; their last three joints have the edges smooth, except for a few small jointed spinules at the base of the posterior border of the dactylus. The last pair of legs have

the posterior edge of their subcylindrical meropodite closely spinate and have only a single terminal spine on the upper edge, the carpus has a strong terminal spine on its posterior border, and the propus has a salient group of spines behind the middle of its posterior border forming a subcheliform stump for the serrated posterior edge of the claw-like dactylus.

Colour in life salmon-pink.

Andaman Sea, 188–220 fathoms, a male and a female; 370–419 fathoms, 3 males and 3 females. Bay of Bengal, off Coromandel Coast, 145–250 fathoms, a male and a female. Gulf of Manár, off Colombo, 142–400 fathoms, 2 young males.

Dimensions of carapace of a full-grown specimen 41 millim. long, 36 millim. broad.

The gills are fourteen in number on either side, arranged as in *Homola barbata*, exclusive of a quite rudimentary posterior arthrobranch to the penultimate pair of legs.

#### Subgenus *Paromola*.

#### 23. *Homola profundorum*, Alcock and Anderson.

*Homola profundorum*, Alcock and Anderson, Ann. Mag. Nat. Hist. Jan. 1899, p. 5: Alcock, Investigator Deep-Sea Brachyura, p. 10, pl. i. fig. 2.

Carapace very decidedly macruriform, deep, ovoid-triangular, broadest abaft the middle of the branchial region, tapering to an acutely-spiniform rostrum of which the length is about a third that of the rest of the carapace. Diverging from either side of the base of the rostrum is a spine of similar form and size. The only other elevations on the carapace are a hepatic spine just behind the hollow for the retracted eye, an antennal spine just outside the antennal base, and a blunt denticle near the middle of the ill-defined lateral border.

The gastric region is well delimited, and the *linea anomurica* is broad conspicuous and dorsal.

The stout cylindrical terminal joint of the eye-stalks is longer than the slender basal joint, the eyes are of good size, well pigmented, and hemispherical.

The chelipeds are slender but are stouter than the legs; the arm has the outer lower border spinate and, on the upper border, a few spinules and a strong terminal spine; both the inner and the outer angles of the wrist are armed with a strong spine, the fingers are much shorter than the hand and have the cutting-edge entire.

The legs are slender and subcylindrical, the 2nd and 3rd pair, which are slightly longer than the first, are at least three times the length of the carapace. In the first 3 pair there are a few distant

spines and a strong terminal spine on the anterior border of the merus, a few articulating spinules at the far end of the posterior border of the propodite, and a comb of articulating spines along the posterior border of the dactylus—the last joint being but half the length of the last but one. The dorsal fourth pair of legs are far slenderer than the others and do not reach the end of the merus of the preceding pair: their propodite is triangular, owing to the expansion of its posterior border, and opposes a sharply-serrated edge to the less strongly toothed posterior border of the short dactylus—the parts being cheliform rather than subcheliform.

The body and appendages are coated with very short distant bristles which do not conceal the surface: there are some longer and thicker bristles along the edges of the chelipeds, and a very few scattered hairs along the edges of the legs.

Three young females from off the Travancore coast, 430 fathoms.

The carapace of these is about 13 millim. long, and about 9 millim. in greatest breadth.

#### PAROMOLOPSIS, Wood-Mason.

*Paromolopsis boasi*, Wood-Mason, Ann. Mag. Nat. Hist., March, 1891, p. 268.

*Paromolopsis*, Alcock, Investigator Deep-Sea Brachyura, p. 11.

Resembles *Homola* but differs in the following important particulars:—

The carapace is "more brachyurous:" it is urn-shaped and *depressed*, its sides being far from vertical and being overhung by the sharply defined lateral borders. The hepatic region is elongate and advanced, so that the hepatic spine is on a level with the spines of the anterior border, and helps to form a very decided false-orbit. The buccal cavern is scarcely broader in front than behind.

In other respects it agrees with *Homola* and more particularly with the subgenus *Homolaz*.

The branchial formula is the same as that of *Homola*.

#### 24. *Paromolopsis boasi*, Wood-Mason.

*Paromolopsis boasi*, Wood-Mason, Ann. Mag. Nat. Hist., March 1891, p. 268 and fig. 5: Alcock, Investigator Deep-Sea Brachyura, p. 11.

Every exposed surface of the body and appendages, excepting only the flagella of the antennæ, is covered with an even, velvet-like, tomentum.

Carapace ending in a short triangular rostrum with an upturned tip, its greatest breadth, which is across the middle of the branchial regions, is equal to its length without the rostrum. Unlike the species

of *Homola*, the lateral border is well-defined throughout, is carinated, is co-extensive with the length of the carapace, and ends in a large triangular hepatic spine the tip of which is on a level with the tips of the spines of the anterior border: these are four in number, one on either side of the rostrum and one at either outer orbital angle.

There is an antennal spine and spinule, there are some definitely-placed nodular swellings on the well defined gastric region, and the surface of the denuded carapace is granular, but there are no spines other than those mentioned.

The swollen terminal joint of the eyestalk is rather longer than the slender basal joint: eyes of good size, well pigmented, hemispherical, retractile into a very decided hollow in the front wall of the hepatic region.

The 2nd joint of the antenna-peduncle is not produced or acute at the antero-external angle; the antennal flagellum is much longer than the carapace.

Chelipeds (in the adult female and young male) short, just reaching beyond the end of the carpus of the first pair of legs: the arm is slenderer than the corresponding joint of the first three pair of legs: the fingers are longer than the hands: none of the joints are spinate.

The second and third legs, which are longer than the first by their dactylus, and longer than the fourth by their merus and dactylus, are 3 times the length of the carapace. In the first three pair of legs the anterior border of the meropodite is armed with large spines, but the other joints are unarmed: the dactylus is slender, curved, and of great length, being hardly shorter than the preceding joint.

In the subcheliform, dorsal, fourth pair the anterior border of the merus ends in a spine and the posterior border of the merus is spiny throughout, the propus is much dilated and toothed at its basal angle posteriorly, so as to be *l*-shaped and has one or two spines on the undilated portion of its posterior border, and the dactylus is short and is toothed along the posterior border.

The abdomen of the male consists of seven segments.

The carapace of an adult female is 45 millim. long and 43·5 millim. broad.

The colours in life vary from red to bluish-pink.

In the Indian Museum are a large female and three young females from off the Andamans, 480–500 fathoms, 498 fathoms and 561 fathoms; a young male, a large adult female and four young females from off the Travancore coast, 406 and 430 fathoms; a large female with eggs from off the Laccadives, 360 fathoms; and a young female from off Colombo, 597 fathoms.

## HYPSOPHRYS, Wood-Mason.

*Hypsophrys superciliosa*, Wood-Mason, Ann. Mag. Nat. Hist., March, 1891, p. 269.

*Hypsophrys*, Alcock, Investigator Deep Sea Brachyura, p. 12.

Carapace deep, longer than broad, quadrilateral or ovate-oblong, with deep vertical parallel sides, the gastric region well delimited and occupying its anterior half, the *linea anomurica* dorsal, distinct or indistinct.

Front narrow, forming a simple or bifid rostrum which has a spine on either side of its base.

The orbits do not afford any concealment to the eyes, but form, on either side of the rostrum, a broad concave facet sharply marked off from the rest of the carapace by a ridge that arches round dorsally from the rostrum to the antennal spine: at the upper and inner angle of this facet is a well defined hollow that catches the knee of the 2nd and 3rd joints of the antennular peduncle when fixed. The eyes are well formed: the terminal joint of the eyestalk is barrel-shaped much as in *Homola*, but the slender basal joint is short or obsolescent, so that the eyes do not appreciably project beyond the edge of the orbital facet.

The antennules and antennæ are identical with those of *Homola*.

The mouth-parts also are very like those of *Homola*, but as the outer border of the merus of the external maxillipeds is hardly at all expanded these appendages are even more pediform than in *Homola*.

Chelipeds slender, spiny, equal. Legs of the first three pair long, with broad compressed meropodites. Fourth pair of legs short, very slender, cheliform, their dactylus, which is many times shorter than their propus, shutting down against and co-terminous with the slightly expanded distal end of the propus.

The abdomen of both sexes consists of seven separate segments.

In general form *Hypsophrys* resembles *Homola barbata*, but it differs from *Homola* in the following particulars:—

1. The eyestalks are like those of *Dromia*, the long slender basal joint of *Homola* being reduced to next to nothing.

2. Though there are no true orbits there are distinct orbital facets, and the homologies of these with the orbits of *Dromia*—in respect both of conformation and of common use for eyes and antennules—are unmistakeable.

3. The external maxillipeds are unequivocally pediform, the merus being hardly broader than the ischium.

4. The fourth (last) pair of legs have the subchelæ or chelæ quite different in form: the propodite is long and is slightly expanded at its distal end, and the dactylus is a minute joint, ever so much smaller

than the propodite, that shuts down against the *distal border* of the latter like the blade of a knife.

The branchial formula of *Hypsophrys* is exactly the same as that of *Homola*.

25. *Hypsophrys superciliosa*, Wood-Mason.

*Hypsophrys superciliosa*, Wood-Mason, Ann. Mag. Nat. Hist., March 1891, p. 269: Illustrations of the Zoology of the "Investigator," Crust. pl. xiv. figs. 4, 4a, 1895: Alcock, Investigator Deep Sea Brachyura, p. 14.

Rostrum simply pointed. Linea anomurica rather indistinct.

Four small spines or teeth on the anterior (orbital) border of the carapace, two being far apart at the base of the rostrum and one at either outer orbital angle. Two, or all four, of these teeth may be obsolescent or obsolete.

Lateral borders of dorsum of carapace not defined, except by a single isolated spine on the hepatic region. Gastric region sharply subdivided into three subregions, of which the lateral are somewhat nodular. Two or three spines on the subhepatic and suborbital region, the innermost of which is "antennal," also sometimes a few spinules.

Eyes well formed and faceted, but pale. Antennal flagella about half again as long as the carapace.

The pediform external maxillipeds have their surfaces and edges devoid of spines.

Chelipeds slender, but much more massive than the legs, about half a hand-length shorter than the first pair of legs in the adult male: spines and spinules in rows on edges and on both inner and outer surfaces of arms, wrists and hands: fingers about three-fourths the length of the palm.

The second pair of legs, which are slightly longer than the first and third and considerably more than twice the length of the fourth, are slightly more than three times the length of the carapace.

In the first three pair the meropodites are compressed, with the anterior border spiny and the posterior border much less strongly and profusely spiny; the other joints are slender and unarmed, except for a few articulating spinelets at the far end of the posterior border of the propodite and in the basal half of the posterior border of the dactylus; the dactylus is slightly shorter than the propodite.

The fourth (dorsal) pair are very slender and are unarmed except at their cheliform ending: their propodite is many times longer than the dactylus.

The terminal joint of the male abdomen is bluntly triangular.

There are some soft bristles on the chelipeds, and a few on the legs, and some very short and inconspicuous hairs on the carapace.

Colours in life, pink.

The carapace of a large egg-laden female is 19 millim. long and 15 millim. broad.

This species has frequently been taken in the Laccadive Sea and in the sea to the north of the Laccadives at depths ranging from 740 to 931 fathoms, on soft bottoms.

In the Indian Museum are more than 30 specimens representing both sexes, both adult and in young stages.

26. *Hypsophrys longipes*, Alcock and Anderson.

*Hypsophrys longipes*, Alcock and Anderson, Ann. Mag. Nat. Hist., Jan. 1899, p. 6: Alcock, Investigator, Deep-Sea Brachyura, p. 15, pl. i. fig. 1.

Rostrum deeply bifid. Linea anomurica distinct.

Four large spines on the anterior border of the carapace—two close together at the base of the rostrum, one at either orbital angle.

Lateral borders of dorsum of carapace well defined, spinulate; the ridge on the side-wall of the carapace that defines the branchial regions anteriorly is also spinulate. A row of spines on the hepatic region, the largest of which is on the lateral border of the carapace and has a spine dorsad of it.

Gastric region obscurely subdivided, each lateral subregion is armed with 5 or 6 large spines, while on the median region there is a central spine sometimes followed by a row of spinules. Subhepatic and sub-orbital region with numerous large spines, one of which is "antennal."

Eyes well pigmented. Antennal flagella more than twice the length of the carapace.

Rows of spinules on the exposed surface of the ischium merus and exognath of the external maxillipeds, and a row on the basal joint of the antennules.

Chelipeds slender, reaching not far beyond the end of the carpus of the first pair of legs, the arm and wrist not stouter than the meropodites of the first three pair of legs; spinate and spinulate as in the preceding species; fingers as long as the hand.

The second and third pair of legs, which are slightly longer than the first and three times as long as the fourth, are four times the length of the carapace. In the first three pair of legs the merus is compressed and has its anterior border spinate and its posterior borders spinulate, the posterior border of the propodite carries a few distant articulating spinolets, and the dactylus—which is about two-thirds the length of the

preceding joint—has a close comb of articulating spines along its posterior border.

The fourth (dorsal) pair, which are extremely slender, have the posterior border of the merus strongly spinate: the propodite is several times longer than the minute dactylus.

The terminal joint of the male abdomen ends acutely.

Hairs and bristles are sparsely present just as in the preceding species.

The carapace of a large egg-laden female is 38 millim. long and 30 millim. broad.

In the Indian Museum are eleven specimens, representing adults and young of both sexes, dredged off the coast of Travancore at 430 fathoms, on a bottom which, though muddy, was abundantly covered with coral.

## Family II. LATREILLIDÆ.

### *Key to the genera of the Family Latreillidæ.*

- |   |                |
|---|----------------|
| I. Carapace subquadrilateral. Antennæ long. All seven abdominal segments distinct in both sexes ... ..  | LATREILLOPSIS. |
| II. Carapace piriform, its anterior portion forming a long subcylindrical "neck." Antennæ short. The 4th, 5th, and 6th abdominal segments of the female are fused together ... .. | LATREILLIA.    |

### LATREILLOPSIS, Henderson.

*Latreillopsis*, Henderson, Challenger Anomura, p. 21: Ortmann in Bronn's Thier-Reich, v. ii. Arthropoda, p. 1156.

Carapace subquadrilateral, deepish, with vertical side-walls, not entirely concealing the basal joints of the legs: the regions fairly well indicated. Front of moderate width, ending in a spiniform rostrum on either side of which is a long slender divergent "supra-ocular" spine. Linea anomurica present, most distinct posteriorly.

Eyes as in *Latreillia*, large and borne free at the end of slender eyestalks of remarkable length. Antennæ long, freely movable from their base; the peduncle slender, cylindrical, and consisting of four joints, as usual.

Epistome well demarcated from the palate. Buccal cavern much broader in front than behind, the efferent branchial channels very well defined. Though the external maxillipeds do not quite meet across the buccal cavern they are distinctly operculiform, owing to the expansion of their merus.

Chelipeds long and slender but much shorter than the first three pair of legs: their joints, like those of the legs, are cylindrical, and the palm in the male is enlarged and club-shaped.



Legs slender, the first three pair very long; the fourth pair reduced in length, and subchelate.

The abdomen in both sexes consists of 7 separate segments.

The branchial formula is exactly the same as that of *Latreillia penifera*, and is as follows:—

Somites and their appendages.		Podo- branchiæ.	Arthrobranchiæ.				Pleuro- branchiæ.			
			Anterior.		Posterior.					
VII.	...	0 ep.	...	0	...	0	...	0	=	ep.
VIII.	...	1+ ep.	...	0	...	0	...	0	=	1+ ep.
IX.	...	0+ ep.	...	1	...	1	...	0	=	2+ ep.
X.	...	0	...	1	...	1	...	0	=	2
XI.	...	0	...	0	...	0	...	1	=	1
XII.	...	0	...	0	...	0	...	1	=	1
XIII.	...	0	...	0	...	0	...	1	=	1
XIV.	...	0	...	0	...	0	...	0	=	0
		1		2		2		3	=	8+3 ep.

*Distribution* : Oriental Seas (Andaman S. and Philippine S.).

## 27. *Latreillopsis bispinosa*, Henderson.

*Latreillopsis bispinosa*, Henderson, Challenger Anomura, p. 22, pl. ii. fig. 3. ♀.

Carapace longer than broad, shaped much as in *Homola*: frontal region with three sharp slender spines, the middle one—which is the shortest and is slightly deflexed—being the rostrum, the other two—which are about a third the length of the carapace and are slightly up-tilted—being placed above the bases of the eye-stalks.

Gastric region tumid, with a tubercle posteriorly and a curved transverse row of tiny tubercles anteriorly. Cardiac region small, tumid, culminating in two tubercles placed side by side or confluent. Branchial regions with an irregular surface, and with one or two tiny spinules on the side wall.

Hepatic regions standing out like a pair of little wings, with two spines—the foremost of which is nearly as long as the rostrum—projecting obliquely forwards from their prominent outer angle, and with one or two small spinules on their under surface.

Eyestalks nearly as long as the supra-ocular spines. Antennal peduncle about as long as the eyes and eye-stalks combined, the flagellum more than three-fourths the length of the carapace.

Chelipeds and legs slender, cylindrical, practically smooth, except for a spine at the far end of the anterior (extensor) border of the merus.

The chelipeds in the male are just over twice, in the female less than twice, the length of the carapace without the rostrum. In the

female they are hardly stouter than the legs; but in the male they are distinctly stouter, especially as regards the palm, which is club-shaped: the palm is much longer than the fingers.

The first three pair of legs increase in length, gradually but slightly, from before backwards, the 3rd pair being between 4 and  $4\frac{1}{2}$  times the length of the carapace: the dactyli are long and curved.

The fourth pair of legs are a little longer than the male chelipeds: their last two joints are short, and the dactylus folds down, like a knife-blade, on a double row of spines along the posterior border of the propodite.

In both sexes the last abdominal tergum is shaped like a spear-head, and the 2nd, 3rd, 4th and 6th terga have an acute tubercle in the middle line.

The carapace of an egg-laden female is 8 millim. long, the same length as that of an apparently adult male.

Colours in spirit yellow, the fingers and eyes dark brown.

In the Indian Museum are two males and a female from the Andaman Sea, 53 fathoms (*not* the same station as that where *Latreillia* was dredged).

*Distribution*: Off the Andamans and off the Philippines.

#### LATREILLIA, ROUX.

*Latreillia*, Roux, Crust. Medit. pl. xxii. and text: Milne Edwards, Hist. Nat. Crust. I. p. 277: DeHaan, Faun. Japon., Crust., p. 105: Heller, Crust. Sudl. Europ. p. 146: Henderson, Challenger Anomura, p. 23: A. Milne Edwards and Bouvier, Crust. Decap. Hirondelle, Brach. et Anom. (Monaco 1894) p. 59: Bouvier, Bull. Soc. Philom. 1896, p. 64: Ortmann in Bronn's Thier-Reich, V. ii., Arthropoda, p. 1156.

Carapace elongate-piriform, not covering the basal joints of the legs, its anterior part prolonged to form a subcylindrical "neck" at the end of which are the spiniform rostrum, lying deflexed between two long slender divergent "supra-ocular" spines, the eyes, the antennules, and the antennæ. The regions are fairly well indicated, and there is no *linea anomurica*.

Eyes much as in *Homola*, large and borne free at the end of very long and slender basal stalks. Antennæ short, of filiform slenderness, freely movable from their base.

Epistome of great length fore and aft, corresponding with the "neck" of the carapace. Buccal cavern well demarcated from the epistome, the efferent branchial channels well defined. External maxillipeds not completely closing the buccal orifice: they have a pediform cast, the ischium and merus being rather narrow and the flagellum coarse.

Chelipeds long and slender, but always much shorter than the first three pair of legs: all the joints are slender, except the palm, which in one or both sexes is club-shaped. Fingers shorter than the palm.

First three pair of legs very long and slender; some of their joints are spiny.

Fourth pair of legs more or less reduced in length, subdorsal in position.

The abdomen of the male consists of seven separate segments; that of the female consists of five segments—the 4th, 5th and 6th being fused together.

The branchial formula given by Bouvier for *Latreillia elegans*, and verified by myself for *Latreillia pennifera*, is as follows:—

Somites and their appendages.	Podo- branchiæ.	Arthrobranchiæ.				Pleuro- branchiæ.		
		Anterior.		Posterior.				
VII. ...	0 ep. ...	0	...	0	...	0	=	0 ep.
VIII. ...	1+ep. ...	0	...	0	...	0	=	1+ep.
IX. ...	0+ep. ...	1	...	1	...	0	=	2+ep.
X. ...	0	...	1	...	1	0	=	2
XI. ...	0	...	0	...	0	1	=	1
XII. ...	0	...	0	...	0	1	=	1
XIII. ...	0	...	0	...	0	1	=	1
XIV. ...	0	...	0	...	0	0	=	0
	1+3 ep.	2		2		3	=	8+3 ep.

*Distribution*: Atlantic coasts of North America between 38° and 40° N.: off the Canaries and Azores: Mediterranean Sea: Bay of Bengal and Andaman Sea: Japanese Seas: New South Wales coast.

## 28. *Latreillia pennifera*, n. sp.

Very closely related to *L. elegans*, Roux.

Carapace smooth, without spines, though the hepatic regions have a strong bulge: the "neck" is rather slender (equally so in both sexes) and is nearly as long as the rest of the carapace measured in the middle line.

Rostral spine short, acute, strongly deflexed. Supraocular spines as long as the eyestalks, about half the total length of the carapace ("neck" included) measured in the middle line; occasionally bearing some tiny secondary spinules.

Antennules slightly longer than the eyestalks: the outer flagellum longer and very much coarser than the inner.

The chelipeds, which are slightly longer in the male than in the female, are between  $3\frac{1}{2}$  and 4 times the total length of the carapace:

their joints are long, slender, and cylindrical, except the palm of the male, which is club-shaped: there are a few spines on the arm, but the other joints are smooth: the fingers are not half the length of the hand (palm).

The first three pair of legs, though they increase slightly in length from before backwards, are not very dissimilar in length, the first pair being nearly 8 times the total length of the carapace. All their joints are slender: the merus is spinate, the carpus sparsely spinate, and the propodite is slightly dilated at the far end of the posterior border where there are a few spines.

The last pair of legs are between  $4\frac{1}{2}$  and 5 times the total length of the carapace and reach almost to—in the female even beyond—the end of the carpus of the last pair but one: the merus is rather sparsely spinate, chiefly on the posterior border, and the propodite is plumed on both sides so as to exactly resemble the vane of a feather: the dactylus is extremely short.

In both sexes the last abdominal segment is shaped like a spear-head: in the female the 2nd and 3rd abdominal terga have a median spine and the 4th has a spine at the proximal end of either lateral border.

Colours in spirit yellow. In life the carapace is reddish with longitudinal stripes of dark red, the eyestalks chelipeds and legs are closely cross-banded with red, and the eyes are purplish black.

The carapace of an adult female, with eggs, is 11 millim. long.

14 specimens from the Gulf of Martaban, 53 and 67 fathoms, and from off the northern end of Ceylon, 28 fathoms.





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XVI.—*Materials for a Carcinological Fauna of India*. No. 6. *The Brachyura Catometopa, or Grapsoidæ*.—By A. ALCOCK, M.B.,  
C.M.Z.S., Superintendent of the Indian Museum.

[Received 25th June; Read 4th July.]

In treating the Catometopes I have in the main followed the scheme of Milne Edwards (*Annales des Sciences Naturelles* for 1852 and 1853) as modified by Dana, and I may introduce this paper with a statement of the points at which it deviates from the former of those classical works.

In the first place, following Dana and most subsequent authors, I have evicted the *Telphusidæ*. With them must also go *Gecarcinucus*, which is an undoubted Telphusoid, although it is persistently ranked with the *Geocarcinidæ*.

Again I have followed the lead of Dana in his treatment of the *Gonoplacæa* of Milne Edwards, the genera of which are distributed among the *Ocypodidæ* and the Sesarmine *Grapsidæ*, while *Gonoplax* itself is relegated to the *Carcinoplacidæ*.

This step necessitates a considerable enlargement of Milne Edwards' group of *Carcinoplacinæ*, and a reconstruction of his *Ocypodinæ*, and in carrying this out I have in the main followed Dana's admirable system.

The isolation of *Myctiris* as an independent family, which was first suggested by Dana, is here accented, but at the same time I fully agree with Milne Edwards estimate of this singular form as a "satellite" of the *Ocypodoidæ*.

In grouping the genera of the *Grapsidæ* I have departed very little from the arrangement of Milne Edwards, who recognized—though his successors have ignored it—the independence of the *Varuna* group.

I have adopted Dana's family of *Geocarcinidæ*, but with some hesitation, for Milne Edwards' estimation of the group as a subfamily of *Grapsidæ* has much to recommend it.

I gladly follow Milne Edwards in recognizing the *Hymenosoma* group as a *tribu principale* not distantly related to the *Ocypodes* and quite distinct from and independent of the *Pinnoteræ* group.

As regards additions to the *Catometopa* as known to and recognized by Milne Edwards, I may mention the *Rhizopinæ* (Stimpson, Miers), the *Hexapodinæ*, the *Palicidæ* (which include *Cymopolia* formerly classed with the *Dorippidæ*), and the new family *Ptenoplacidæ*.

From the system of Dana I would dissent only in separating the *Hymenosoma*-group from the *Pinnoteridæ*; in enlarging the *Scopimerinæ* (= *Dotinæ*) at the expense of the *Ocypodidæ*; in splitting the *Grapsinæ* into two equal groups,—one round *Grapsus*, the other round *Varuna*; and in removing *Gecarcinucus* from the *Geocarcinidæ*.

The scheme of classification proposed by Miers seems to me to, too often, disregard natural relations without facilitating the recognition of species by way of compensation.

The most conspicuous instance is the family *Pinnoteridæ*, in which we find *Pinnoteræ* and its kindred included with such undoubted *Ocypodoids* as *Dotilla* and *Scopimera*, with *Mictyris*, with *Hymenosoma* and its allies, and finally with *Hexapus* whose affinities are quite clearly with the *Rhizopinæ*.

Again by the exclusion of *Scopimera* and *Dotilla* and by the inclusion of the *Gonoplacidæ*, Miers family of *Ocypodidæ* becomes unnatural and incomplete.

I follow Miers in treating the *Rhizopinæ* as a subfamily of *Carcinoplacidæ*.

Ortmaun obviates some difficulties by separating *Gonoplax* and *Ommatocarcinus* from the *Carcinoplacidæ* as a distinct family, and by altogether removing the *Hymenosomidæ* from the *Catometopes*. By the latter step his *Pinnoteridæ* gain in natural value, as they further do by the restoration of *Scopimera* and *Dotilla* to their place among the

Ocypodoids; so that both his *Pinnotheridæ* and *Ocypodidæ* are far more natural families than those of Miers. I am doubtful, however, whether Ortmann has assigned its full rank to *Mictyris*, or their proper place to the *Hexapodinæ*.

The Catometope crabs of the Indian fauna number about 140, of which 136 are noticed in the present paper. Of these, 31 are new to science, and include 2 species of *Libystes*, 1 of *Psopheticus*, 2 of *Litochira*, 1 of *Notonyx*, 1 of *Ceratoplax*, 1 of *Typhlocarcinus*, 2 of *Pinnotheres*, 3 of *Dotilla*, 2 of *Scopimera*, 1 of *Clistostoma*, 1 of *Tylodiplax*, 1 of *Elamena*, 2 of *Hymenicus*, 2 of *Ptychognathus*, 1 of *Pyxidognathus*, 3 of *Sesarma*, 2 of *Palicus* (*Cymopolia*), and 1 of each of the following new genera, *Typhlocarcinodes* (*Rhizopinæ*), *Lambdophallus* (*Hexapodinæ*), and *Chasmocarcinops* (*Asthenognathinæ*).

The new species are, for the most part, either little crabs that are liable to be overlooked, or inhabitants of depths which, though moderate, are inaccessible to ordinary collectors.

As heretofore, most of the new species come from the copious collections of the "Investigator" and will be duly figured in the *Illustrations of the Zoology of the R.I.M.S. Investigator*.

### Tribe CATOMETOPA.

*Quadrilatera*, Latreille (pt.), Fam. Nat. du Règne Anim. p. 269.

*Catometopes*, Milne Edwards (pt.), Hist. Nat. Crust. II. p. 1.

*Cancris* (pt.), *Ocypodes*, *Grapsi*, *Pinnotheridea*, De Haan, Faun. Japon. Crust.

*Ocypodidæ*, Milne Edwards (pt.), Ann. Sci. Nat., Zool., (3) XVIII. 1852, pp. 128, 140.

*Grapsoidæ*, Dana, U. S. Expl. Exp. Crust. pt. I. pp. 67, 306.

*Catometopa*, Miers, Challenger Brachyura, p. 216.

*Catometopa*, Ortmann, Zool. Jahrb., Syst. VII. 1893-94, pp. 411, 683, plus *Majoidea* *Hymenosomidæ*, p. 31: and in Bronn's Thier Reich, V. ii. *Arthropoda*, pp. 1165, 1168, 1175.

The carapace is variable, but commonly and typically it is transverse, more or less quadrate, with large branchial and small and indistinct hepatic regions and a broad front. The front also is variable in form, but typically it is much deflexed.

The orbits, typically, occupy the whole or the greater part of the anterior border of the carapace on either side of the front. The typical fold of the antennules is transverse; but it may be oblique, or nearly vertical, and in a few cases there are no distinct fossæ at all into which these appendages can fold.

The epistome, typically, is extremely short, but occasionally it is



of considerable length. The buccal orifice is typically, but by no means always, square cut.

The palp of the external maxillipeds usually articulates either at the summit, or at or near the external angle, of the merus; but often, as in almost the whole family *Gonoplacidae*, it articulates distinctly at the antero-internal angle.

*The genital ducts of the male usually perforate the sternum opposite the last pair of legs: if, as happens in the family Gonoplacidae, they perforate the bases of the last pair of legs, they pass forwards to their destination in a groove in the sternum.*

The abdomen of the male is very often narrow at its base and so does not cover all the space between the last pair of legs.

The branchiæ are often fewer than 9—from 8 to 6—on either side: their efferent channels open on either side of the palate.

The *Catometopa* may be divided into 9 families. One of these, the *Gonoplacidae*, so closely approaches the Cyclometope family *Xanthidae* that such Xanthoid forms as *Geryon* and *Cumtoplex* have by some authors been included in it, while, on the other hand, some of its constituent genera, such as *Gonoplex* and *Carcinoplex*, have been ranged among the Cyclometopes.

Three other families, namely, the *Grapsidae*, the *Geocarcinidae*, and the *Ocypodidae*, include the typical Catometopes, upon which our general conception of the group is founded.

The remaining five families are more or less aberrant, they are the *Pinnoteridae*, the *Mictyridae*, the *Hymenosomidae*, the *Palicidae*, and the *Ptenoplacidae*.

Of these aberrant families, the *Pinnoteridae* are probably most nearly related to the *Gonoplacidae*, the *Mictyridae* to the *Ocypodidae*, and the *Palicidae* to the *Grapsidae*.

The true position of the *Hymenosomidae* appears to me to be still doubtful. Many authors place them near the *Pinnoteridae* and *Mictyridae*, and I think that their most natural place is alongside the *Mictyridae*. Ortmann alone boldly removes them from the Catometope grade altogether and unites them with the Oxyrhyncha, which I think is a decided mistake.

There remains the family *Ptenoplacidae*, which includes the single species *Ptenoplex notopus*. This, though it has a superficial resemblance to *Macrophthalmus*, is remote from that genus in many important characters, and, though it has no look of *Hexapus*, yet shows an attraction to *Hexapus* and *Lumbdophallus* that can hardly be accidental.

The 9 families may be characterized as follows, their compass in relation to the schemes of other authors will be noted in the sequel:—

**Family GONOPHACIDÆ.** Marine Catometopes closely resembling Cyclometopes. The palp of the external maxillipeds articulates at or near the antero-internal angle of the merus, never at the antero-external angle or at the middle of the anterior border: the exognath of the external maxillipeds is of normal size and is not concealed. The interantennular septum is a thin plate. The division of the orbit into two fossæ is not accented.

**Family GRAPSIDÆ.** Littoral (rock-haunting), or pelagic (drift-weed and timber-haunting), or estuarine and paludine, or fluviatile, or rarely terrene Catometopes. The palp of the external maxillipeds articulates either at the antero-external angle, or at the summit, or at the middle of the anterior border of the merus: the exognath is either abnormally slender or abnormally broad. The interantennular septum is very broad. The division of the orbit into two fossæ is accented. [Front of great breadth: carapace usually quadrilateral, with the lateral borders either straight or very slightly arched, and the orbits at or very near the antero-lateral angles: the buccal cavern is square and there is generally a gap, which is often large and rhomboidal, between the external maxillipeds]. Male openings sternal.

**Family GEOCARCINIDÆ.** Terrene Catometopes (Land-crabs). The palp of the external maxillipeds articulates either at the antero-external angle or at the middle of the anterior border of the merus (but is sometimes, though never in any Indian species, completely hidden behind the merus): the exognath is slender and inconspicuous (sometimes more or less concealed) and sometimes carries no flagellum. The interantennular septum is very broad and the antennular fossæ are narrow. The front is of moderate breadth and always strongly deflexed: the carapace is more or less transversely oval, *the antero-lateral borders being strongly arched and the fronto-orbital border being very much less than the greatest breadth of the carapace.* In all the Indian forms there is a wide rhomboidal gap between the external maxillipeds. Male openings sternal.

**Family OCYPOIDÆ.** Amphibious littoral and estuarine crabs, burrowing, and commonly gregarious. The palp of the external maxillipeds is coarse, and articulates at or near the antero-external angle of the merus: the exognath is generally slender and often more or less concealed. The interantennular septum is generally broad, but in one

subfamily (*Macrophthalminæ*) is a thin plate. The front is usually of no great breadth, and is often a narrow lobe more or less deflexed. The orbits occupy the whole anterior border of the carapace outside the front, and their outer wall (between the far ends of the upper and lower borders) is often defective. The buccal cavern is usually large and a little narrower in front than behind, the external maxillipeds are foliaceous and usually completely close it, but if they do not they never leave between them a wide rhomboidal space exposing the mandibles. The abdomen of the male is narrow. Male openings sternal.

Family PINNOTERIDÆ. Small crabs, usually living as commensals in the mantle-cavity of Bivalve Mollusks or Ascidians, in the cloaca of Holothurians, in worm-tubes, or in coral-stocks, and hence often exhibiting degeneration of some of the organs of special sense. The external maxillipeds vary: the merus, though often very large, is never quadrilateral, and never carries the palp distinctly at the antero-internal angle: the ischium is often small, and is sometimes absent or indistinguishably fused with the merus, in which case the merus lies with its long axis directed obliquely or almost transversely inwards: the exognath is small and more or less concealed. The interantennular septum, when distinguishable, is a thin plate. [The front is narrow, the eyes and orbits very small, the cornæ sometimes obsolescent: the antennules and antennæ are usually very small and cramped. The buccal cavern is short and of great breadth, being commonly semi-circular in outline. The male abdomen is very narrow]. Male openings sternal.

Family MICTRIDÆ. Amphibious Catometopes resembling the *Ocypodidæ* in habits. The buccal cavern is of enormous size and is completely closed by the enormous foliaceous convex external maxillipeds, whose coarse palp articulates with the antero-external angle of the merus, and whose short slender exognath is entirely concealed and carries no flagellum. The interantennular septum is narrow. The orbits are represented by a small post-ocular spine, the eyes being quite unconcealed. [Carapace elongate-globose: front a narrow declivous lobe: the rudimentary antennular flagella fold nearly vertically, and are a good deal concealed by the front: the abdomen of the male resembles that of the female and covers the greater part of the sternum. No membranous spaces (*tympana*) on the meropodites of the legs or on the sternum]. Male openings sternal.

Family HYMENOSOMIDÆ. Small marine and estuarine Catometopes having a curious superficial resemblance to some of the Oxyrhynch crabs of the Inachine subfamily, a resemblance heightened by the fact that the epistome is sometimes nearly as long as broad. The palp of the external maxillipeds articulates near the antero-external angle of the merus, but as the antero-internal angle of the merus is sometimes truncated the true relations of the palp are often not quite clear: the exognath is slender and partly or entirely concealed. There are no orbits and the eyes are exposed and little retractile. [Carapace thin, flat, triangular or subcircular, not very well calcified, usually produced to form a horizontal rostrum. Antennular fossæ shallow and ill defined. Antennal peduncle slender. Buccal cavern square, the ischium of the external maxillipeds well developed]. Male openings sternal.

Family PALICIDÆ. Small Catometopes having a sort of *Dorippe* appearance. The Indian members of the family are found among coral and shell-shingle, at a moderate depth, and have a kind of protective resemblance to an eroded flake of coral rock. The external maxillipeds close the buccal cavern ventrally but not anteriorly: their merus is a very small joint articulating with the retreating antero-external angle of the ischium, and carrying the palp at the middle of the oblique-lying anterior (or inner) border, their exognath is not concealed and is rather broad. The interantennular septum is a thin plate. The orbit has 2 or 3 deep gaps in the upper border. Front of moderate breadth, little or not at all deflexed: antennal flagella of good length: epistome absent: abdomen of male narrow. Compared with the other 3 pairs, the 4th (last) pair of legs, which are dorsally situated, are rudimentary in all the Indian species. Male openings sternal: female openings placed far forward on the sternal segment corresponding with the first pair of ambulatory legs (2nd peræopods).

Family PTENOPLACIDÆ. Represented by an aberrant Catometope found only in Indian Seas at a depth of 100 to 250 fathoms. The external maxillipeds are slender and subpediform, not nearly covering the buccal cavity: their palp articulates with the summit of the slender merus: their exognath is of normal size and form, and is not concealed. The interantennular septum is a thin rudimentary plate. The orbits are very incomplete below. The front is a narrow, little deflexed lobe. No distinct antennular fossæ. Antennal flagella of good length. No epistome. Abdomen of male narrow. Compared with the other 3 pairs, the last (fourth) pair of legs are rudimentary, being also placed close together dorsally: the last segment of the sternum is also rudimentary.

The male openings are in the bases of the last pair of legs but the ducts run forward in a sternal groove.

Most of these families can be further split into subfamilies, as is shown in the following scheme :—

#### Family GONOPLACIDÆ. Dana.

*Gonoplaciens*, Milne Edwards (pt.), Hist. Nat. Crust. II. 56.

*Gonoplacis Cancroides* plus *Carcinoplacinae*, Milne Edwards, Ann. Sci. Nat. Zool. (3) XVIII. 1852, pp. 162, 164.

*Gonoplacidae*, Dana, U. S. Expl. Exp. Crust. pt. I. pp. 308, 310.

*Carcinoplacinae* plus *Gonoplacinae* plus *Hezapodinae*, Miers, Challenger Brachyura, pp. 222, 237, 275.

*Carcinoplacini*, Ortmann, Zool. Jahrb., Syst., VII. 1893-94, p. 683.

*Carcinoplacidae* plus *Gonoplacidae* plus *Hezapodinae*, Ortmann in Bronn's Thier Reich, tom. cit. pp. 1175, 1176, 1177.

This family may be divided into the 5 following subfamilies :—

Subfamily I. *PSEUDORHOMBILINÆ* (*Carcinoplacinae* Miers, *Carcinoplacidae* Ortmann). Carapace Xanthoid, the regions seldom well defined: front usually of good breadth and square cut, often little deflexed: eyes and orbits of normal size and form, the eyes well pigmented and the eyestalks normally movable except in certain deep-sea genera: the antennules fold transversely: antennal flagella of fair length. Epistome well defined: buccal cavern square-cut and usually completely closed by the external maxillipeds, which have a subquadrate merus. The base of the male abdomen covers the whole space between the last pair of legs. Male openings not sternal.

Subfamily II. *GONOPLACINÆ* (*Gonoplacinae* Miers, *Gonoplacidae* Ortmann). The anterior border of the subquadrate carapace is entirely occupied by the square-cut front and orbits, the front being either narrow or of fair breadth, and the orbits being long narrow trenches for the elongate eyestalks. In other respects similar to the *Pseudorhombilinæ*.

Subfamily III. *PRIONOPLACINÆ* (not represented in India). Differs from *Pseudorhombilinæ* only in the form of the male abdomen, which is not broad enough at base to cover all the space between the last pair of legs.

Subfamily IV. RHIZOPINÆ (*Rhizopinæ* Miers, Ortmann). With the exception of one species (*Notonyx nitidus*) the eyestalks are fixed, and very often the "cornea" is minute or obsolete: the lower border of the orbit has a tendency to run downwards towards the epistome. The carapace usually has its antero-lateral corners cut away and rounded off: the front may be square-cut and broad, but is more often narrow and more or less distinctly bilobed and deflexed. The antennules may be of fair size and transversely folded, but more often, owing to the narrowness of the front, they are cramped, and fold obliquely: sometimes they cannot be folded in their fossæ at all. Antennal flagella usually short. The epistome may either be well defined and prominent, or ill defined and sunken. The buccal cavern may be squarish, but it often is decreased in breadth anteriorly: the external maxillipeds have a square merus and may completely close the buccal cavern, or there may be a gap between them. The male abdomen does not nearly cover the space between the last pair of ambulatory legs. Male openings sternal.

Subfamily V. HEXAPODINÆ (*Pinnoteridæ-Hexapodinæ* Miers, Ortmann). Only three pairs of legs besides the chelipeds, the last segment of the sternum also aborted. Carapace much broader than long with the antero-lateral corners cut away and rounded off. Front narrow: eyes, orbits and antennæ small: the antennules fold transversely. Epistome well defined: buccal cavern with the sides a little anteriorly-convergent, or not, nearly closed by the external maxillipeds, whose merus is either quadrate or has the antero-external angle rounded off. The male abdomen does not nearly fill the space between the last pair of ambulatory legs. Male openings sternal.

#### Family PINNOTERIDÆ, Edw.

*Pinnotheridæ*, De Haan (part), Faun. Japon., Crust., pp. 5, 34.

*Pinnotheriens*, Milne Edwards (part), Hist. Nat. Crust. II, 28.

*Pinnotherinæ*, Milne Edwards, Ann. Sci. Nat. Zool. (3) XVIII. 1852, p. 188, and XX. 1853, p. 216: Dana, U. S. Expl. Exp., Crust. pt. I. pp. 378, 379: Miers, Challenger Brachyura, p. 274: Ortmann, Zool. Jahrb., Syst., VII. 1893-94, p. 691; and in Bronn's Thier Reich, tom. cit. p. 1177.

I propose, with some diffidence, as I have not examined enough of the forms included, to divide this family into 4 subfamilies:—

Subfamily I. PINNOTERINÆ. Ischium of the external maxillipeds either rudimentary, or indistinguishably fused with the merus to form a single piece which is usually oblique, sometimes transverse. Usually the carapace is not transverse and the palp of the external maxillipeds not so large as the merus-ischium.

Subfamily II. PINNOTHERELINÆ. Ischium of the external maxillipeds distinct and independent, but smaller than the merus, the latter joint little oblique. Usually the carapace is broadly transverse, and often the palp of the external maxillipeds is the largest part of these appendages.

Subfamily III. XENOPHTHALMINÆ. Ischium of the external maxillipeds distinct, as large as or larger than the merus, the latter joint little oblique, the palp of ordinary size. *The orbits are narrow chinks situated dorsally with their long axis at right angles to the anterior border of the carapace.*

Subfamily IV. ASTHENOGNATHINÆ (*Asthenognathidæ* Stimpson). External maxillipeds weak and slender, not nearly meeting across the buccal cavern, the ischium distinct and larger than the merus, the palp of ordinary size. Eyes in the normal position.

#### Family GRAPSIDÆ, Dana.

*Grapsoidiens*, Milne Edwards, Hist. Nat. Crust. II. 68.

*Grapsinæ*, Milne Edwards, Ann. Sci. Nat., Zool., (3) XVIII. p. 136 and XX. p. 163.

*Grapsidæ*, Dana, U. S. Expl. Exp., Crust. p. 329: Miers, Challenger Brachyura, p. 252: Ortmann, Zool. Jahrb., Syst., VII. 1893-94, p. 690, and in Bronn's Thier Reich, tom. cit. p. 1177.

This family can be divided into four well characterized subfamilies as follows:—

Subfamily I. GRAP SINÆ (*Grapsacea*, Edw., *Grapsinæ* in part, Dana, Kingsley, Miers, Ortmann). Front strongly deflexed: the lower border of the orbit runs downwards towards the buccal cavern: antennal flagellum very short: the external maxillipeds leave a wide rhomboidal gap between them, they are not traversed by any oblique hairy crest, their palp articulates at the antero-external angle of the merus, and their exognath is very slender and is exposed throughout. The male abdomen fills all the space between the last pair of ambulatory legs.

Subfamily II. VARUNINÆ (*Varunacea* and *Cyclograpsacea* part, Milne Edwards; *Grapsinæ* in part, Dana, Kingsley, Miers, Ortmann). Front moderately or little deflexed, sometimes sublaminar: the sub-orbital crest, which supplements the defective lower border of the orbit, is rather distant from the orbit and usually runs nearly in a line with the anterior border of the epistome: antennal flagellum usually of good length: the external maxillipeds do not often gape widely, though usually there is something of a gap, they are not traversed by any oblique hairy crest, their palp articulates with the middle of the

anterior border of the merus, and their exognath is generally broad and is exposed throughout. The male abdomen, though not narrow, rarely covers all the space between the last pair of ambulatory legs.

Subfamily III. *SESARMINÆ*. (*Sesarmacea* and *Cyclograpsacea* part, Milne Edwards; *Sesarminæ*, Dana, Kingsley, Miers, Ortmann). Front strongly deflexed: the lower border of the orbit commonly runs downwards towards the angle of the buccal cavern: the external maxillipeds leave a wide rhomboidal gap between them, *an oblique hairy crest traverses them from a point near the antero-external angle of the ischium to a point near the antero-internal angle of the merus*, their palp articulates either at the summit or near the antero-external angle of the merus, and their exognath is slender and either partly or almost entirely concealed. The male abdomen either fills or does not quite fill all the space between the last pair of ambulatory legs. Antennal flagella variable.

Subfamily IV. *PLAGUSIINÆ*. (*Plagusiacea*, Milne Edwards; *Plagusiinæ*, Dana, Kingsley, Miers, Ortmann). The front is cut into lobes or teeth by the antennular fossæ, which are visible in a dorsal view as deep clefts: the lower border of the orbit curves down into line with the prominent anterior border of the buccal cavern: the external maxillipeds do not completely close the buccal cavern but they do not leave a wide rhomboidal gap, they are not traversed by any oblique hairy crest, their palp articulates near the antero-external angle of the merus, and their slender exposed exognath has no flagellum. The antennal flagella are short. The male abdomen fills all the space between the last pair of legs.

#### Family GEOCARCINIDÆ, Dana.

*Gecarciniens*, Milne Edwards, Hist. Nat. Crust. II. 16.

*Gecarcinacea*, Milne Edwards (pt.), Ann. Sci. Nat., Zool., (3) XX. 1853, p. 200.

*Gecarcinidæ*, Dana (pt.), U. S. Expl. Exp. Crust. pt. I. p. 374.

*Geocarcinidæ*, Miers, Challenger Brachyura, p. 216.

*Gecarcinidæ*, Ortmann (pt.), Zool. Jahrb. Syst. VII. 1893-94, pp. 699, 732, and in Bronn's Thier Reich, tom. cit. p. 1178.

I think it inadvisable to subdivide this small group, which Milne Edwards, with more justice, regarded as itself only a subfamily of the *Grapsidæ*.

*Gecarcinucus* is a Telpusoid and should not be referred here. *Epigrapsus* and *Grapsodes*, if they are distinct from one another, belong here rather than to the *Grapsidæ*.



## Family PALICIDÆ (vel CYMOPOLIDÆ).

This little and aberrant family is probably best treated as an appendage to the *Grapsidæ*.

## Family OCYPODIDÆ, Ortmann (pt.).

*Ocypodiens*, Milne Edwards, Hist. Nat. Crust. II. p. 39.

*Ocypodinæ*, Milne Edwards, Ann. Sci. Nat. Zool. (3) XVIII. 1852, p. 140, plus *Gonoplacés Vigils* (pt.), p. 155.

*Macrophthalmidæ*, Dana, U. S. Expl. Exp. Crust. pt. I. pp. 308, 312.

*Ocypodinæ*, Miers (pt.), Challenger Brachyura, p. 236, and *Myctirinæ* (pt.), p. 275.

*Ocypodidæ*, Ortmann (pt.), Zool. Jahrb., Syst., VII. 1893-94, pp. 700, 741; and in Bronn's Thier Reich, tom. cit., p. 1179.

In the treatment of this family nothing can be added to the scheme of Dana, where they are divided into 3 sub-families as follows:—

Subfamily I. OCYPODINÆ (*Ocypodiacés Ordinaires* Edw., *Ocypodinæ* Dana (pt.), Miers (pt.), Ortmann). Carapace deep, subquadrilateral, the regions seldom well defined: front narrow deflexed, commonly a mere lobe between the long eyestalks: antennular flagellum small, folding obliquely or almost vertically, the interantennular septum broad: the external maxillipeds completely close the buccal cavern, their exognath is inconspicuous but is not, or not entirely, concealed, and may either have, or be destitute of, a flagellum: chelipeds remarkably unequal either in both sexes or in the male only. *There is an orifice or recess, the edge of which is thickly fringed with hair, between the bases of the 2nd and 3rd pairs of true legs.*

Subfamily II. SCOPIMERINÆ (*Ocypodiacés Globulaires* Edw., *Dotinæ* Dana, *Myctirinæ* (pt.) Miers, Ortmann). Carapace very deep, cuboidal or globose: front narrow deflexed, commonly a mere lobe: antennular flagellum rudimentary, folding nearly vertically and hidden beneath the front, interantennular septum broad: buccal cavity large, sometimes enormous, completely closed by the external maxillipeds which are commonly very prominent and have small linear concealed exognaths with or without a flagellum: chelipeds equal or subequal in both sexes. *Orbits shallow. Curious membranous spaces known as "tympans" exist on the meropodites of the legs and often of the chelipeds also; and sometimes on some of the segments of the sternum. No hairy recesses between the bases of the 2nd and 3rd pairs of true legs.*

Subfamily III. MACROPHTHALMINÆ. (*Gonoplacés Vigils* pt. Edw., *Macrophthalminæ* Dana, Miers, Ortmann). Carapace usually quadrilateral, broader than long (sometimes more than twice as broad as long),

flattish and not very deep, the regions usually well defined: front variable, but never very broad: antennules with a well developed flagellum that folds transversely, interantennular septum very narrow: eyestalks usually elongate: the external maxillipeds do not always meet across the buccal cavern, though the gap between them is never very wide, their exognath is not, or not entirely, concealed and has a flagellum: chelipeds usually subequal. No special recess between the bases of any of the legs.

### Family MICTYRIDÆ, Dana.

*Pinnothériens*, Milne Edwards (pt.), Hist. Nat. Crust. II. 39.

*Myctiroidea*, Milne Edwards, Ann. Sci. Nat., Zool., (3) XVIII. 1852, p. 154.

*Mictyridæ*, Dana, U. S. Expl. Exp., Crust. pt. I, pp. 309, 389.

*Pinnotheridæ-Myctirinx*, Miers (pt.), Challenger Brachyura, p. 275; Ortmann (pt.) in Bronn's Thier Reich, tom. cit., p. 1179.

*Ocypodidæ-Myctirinx*, Ortmann (pt.), Zool. Jahrb., Syst. VII. 1893-94, pp. 742, 747.

There can be little question that Milne Edwards was right in reckoning *Mictyris* as a "satellite" of the *Ocypodidæ*, or that Dana's plan of separating them as a distinct family is fully justified. The affinities which several authors find between *Mictyris* and the *Pinnotheridæ* are by no means easy to recognize.

### Family HYMENOSOMIDÆ, Ortmann.

*Pinnothériens*, Milne Edwards (pt.), Hist. Nat. Crust. II. 39.

*Hymenosominæ*, Milne Edwards, Ann. Sci. Nat., Zool. (3) XX. 1853, p. 221.

*Pinnotheridæ-Hymenicinæ*, Dana, U. S. Expl. Exp., Crust. pt. I. pp. 379, 384.

*Pinnotheridæ-Hymenosominæ*, Miers, Challenger Brachyura, p. 275.

*Majoidea-Hymenosomidæ*, Ortmann, in Bronn's Thier Reich, tom. cit., p. 1168.

Three types seem to be distinguishable in this family: in one (e.g. *Hymenosoma*) there is no epistome and the external maxillipeds almost encroach on the bases of the antennules, which appendages are not concealed by the front; in the second (e.g. *Halicarcinus*) there is an epistome of considerable length, but the antennules are still unconcealed by the front; in the third (e.g. *Hymenicus*) there is a long epistome and the antennules are quite concealed by the front.

### Family PTENOPLACIDÆ.

This family has no very close connexions with any of the others although it is an undoubted Catometope.

The following is a list of all the Catometope genera known to me arranged according to the foregoing scheme. As in previous papers, the genera known to me by autopsy are marked with an asterisk, and all the Indian genera are printed in roman type.

Family GONOPLACIDÆ, Dana.

Subfamily I. PSEUDORHOMBILINÆ, nov.

? *Brachygrapsus*, J. S. Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, p. 203.

*Bathyplox*, A. Milne Edwards, Bull. Mus. Comp. Zool., VIII, 1880-81, p. 16 : Miers, Challenger Brachyura, p. 230.

? *Camptandrium*, Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 106.

\* *Carcinoplax* (= *Curtonotus*).

\* *Catoptrus* (= *Goniocaphyra*).

? *Cryptocaloma*, Miers, Zool. H. M. S. Alert, p. 227.

\* *Eucrate*.

*Freyvillea*, A. Milne Edwards, Bull. Mus. Comp. Zool. VIII, 1880-81, p. 15.

*Heteroplax*, Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 94.

\* *Libystes*.

\* *Litochira*.

\* *Pilumnoplax*.

\* ? *Platypilumnus*.

\* *Pseudorhombila*.

\* *Psopheticus*.

Subfamily II. PRIONOPLACINÆ, nov.

*Eucratoplax*, A. Milne Edwards, Bull. Mus. Comp. Zool. VIII, 1880-81, p. 17.

*Eucratopsis*, Smith, Amer. Journ. Sci. XLVIII, 1869, p. 391, and Trans. Connect. Acad. II. 1871-73, p. 35.

*Euryplox*, Stimpson, Ann. Lyc. Nat. Hist., New York, VII, 1862, p. 60.

*Glyptoplax*, Smith, Trans. Connect. Acad. II, 1871-73, p. 164.

*Oediplax*, Mary J. Rathbun, P. U. S. Nat. Mus. XVI, 1893, p. 241.

*Panoplax*, Stimpson, Bull. Mus. Comp. Zool. II, 1870-71, p. 151.

*Prionoplax*, Milne Edwards, Ann. Sci. Nat., Zool., (3) XVIII, 1852, p. 163.

*Speocarcinus*, Stimpson, Ann. Lyc. Nat. Hist., York, VII, 1862, p. 58.

## Subfamily III. GONOPLACINÆ, Miers.

\* *Gonoplax*, Leach, Trans. Linn. Soc. XI, 1815, p. 323: Miers, Challenger Brachyura, p. 245.

*Ommatocarcinus*, White, in Voy. H. M. S. Rattlesnake, II, p. 393; Miers, Challenger Brachyura, p. 246.

## Subfamily IV. RHIZOPINÆ, Stimpson, Miers.

\* *Camatopsis*.

\* *Ceratoplax*.

? *Chasmocarcinus*, Mary J. Rathbun, Bull. Nat. Hist. Iowa, 1898, p. 284.

\* *Hephthopelta*.

\* *Notonyx*.

*Rhizopa*, Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 95.

\* *Scolopidia* (= *Hypophthalmus*).

\* *Typhlocarcinus*.

\* *Typhlocarcinodes*.

\* *Xenophthalmodes*.

## Subfamily V. HEXAPODINÆ, Miers.

*Amorphopus*, Bell, Journ. Linn. Soc., Zool., III, 1859, p. 27.

\* *Hexapus*, De Haan, Faun. Japon. Crust., p. 35.

\* *Lambdophallus*.

*Thaumastoplax*, Miers, Ann. Mag. Nat. Hist. (5) VIII, 1881, p. 261.

## Family PINNOTERIDÆ, Edw.

## ? Subfamily I. PINNOTERINÆ, nov.

*Cryptophrys*, Mary J. Rathbun, P. U. S. Nat. Mus. XVI, 1893, p. 250.

*Dissodactylus*, S. I. Smith, Trans. Connect. Acad. II, 1871-73, p. 172.

*Durckheimia*, de Man, Zool. Jahrb., Syst., 1889, p. 442.

*Fabia*, Dana, Proc. Ac. Nat. Sci. Philad. 1851, p. 253, and U. S. Expl. Exp., Crust. pt. I. p. 382.

? *Holothuriophilus*, Nauck, Zeits. Wiss. Zool. XXXIV, 1880, pp. 24, 66.

*Ostracoteres*, Milne Edwards, Ann. Sci. Nat., Zool., (3) XX, 1853, p. 219.

? *Parapinnixa*, Holmes, Proc. Calif. Acad. IV, 1893-94, pp. 565, 587.

*Pinnaxodes*, Heller, Novara Crust., p. 67.

\* *Pinnoterres*.

? *Scleroplax*, Mary J. Rathbun, P. U. S. Nat. Mus. XVI, 1893, p. 250.

\* *Xanthasia*.

? Subfamily II. *PINNOTHERELINÆ*, nov.

? *Malacosoma*, de Man, Notes Leyden Mus. I, 1879, p. 67.

*Opisthopus*, Mary J. Rathbun, P. U. S. Nat. Mus. XVI, 1893, p. 251.

*Pinnixa*, White, Ann. Mag. Nat. Hist. XVIII. 1846, p. 177 (= *Tubicola*, Lockington, Proc. Calif. Acad. VII. 1876, p. 55).

*Pinnotherelia*, Milne Edwards and Lucas, in Voy. Amér. Mérid., Crust. p. 24 (1843).

*Pseudopinnixa*, Ortmann (*nec* Holmes), Zool. Jahrb., Syst. VII, 1894, p. 694.

\* *Tetrias*.

? *Tritodynamia*, Ortmann, Zool. Jahrb., Syst. VII, 1194, p. 692.

? Subfamily III. *XENOPHTHALMINÆ*, nov.

\* *Xenophthalmus*.

? Subfamily IV. *ASTHENOGNATHINÆ*, Stimpson.

*Asthenognathus*, Stimpson, Proc. Acad. Nat. Sci. Philad. 1858, p. 107.

\* *Chasmocarcinops*.

Family OCYPODIDÆ, Ortmann, emend.

Subfamily I. *OCYPODINÆ*, Dana.

*Acanthoplax*, Milne Edwards, Ann. Sci. Nat. Zool. (3) XVIII, 1852, p. 151.

\* *Gelasimus*.

\* *Heloeccius*, Dana, Amer. Journ. Sci., (2) XII, 1851, p. 286, and U. S. Expl. Exp., Crust. pt. I. p. 319.

\* *Ocypoda*.

Subfamily II. *MACROPHTHALMINÆ*, Dana.

\* *Clistostoma*.

*Chænostoma*, Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 97.

*Euplax*, Milne Edwards, Ann. Sci. Nat., Zool., (3) XVIII, 1852, p. 160; Miers, Challenger Brachyura, p. 251.

*Hemiplax*, Heller, *Novara Crust.* p. 40: Miers, *Challenger Brachyura.* p. 250.

\**Macrophthalmus*.

*Paracliotostoma*, de Man, *Zool. Jahrb., Syst.*, VIII, 1895, p. 580.

\**Tylodioplax*.

### Subfamily III. SCOPIMERINÆ.

\**Dotilla* (= *Doto*, De Haan).

*Ilyoplax*, Stimpson, *Proc. Ac. Nat. Sci. Philad.* 1858, p. 98.

\**Scopimera*.

\**Tympanomerus* (= *Diovippe*, de Man).

### Family MICTYRIDÆ, Dana.

\**Mictyris*.

### Family HYMENOSOMIDÆ, Ortmann.

\**Elamene*.

?? *Elamenopsis*, A. Milne Edwards, *Nouv. Archiv. du Mus.* IX, 1873, p. 324.

\**Halicarcinus*, White, *Ann. Mag. Nat. Hist.* XVIII, 1846, p. 178: Miers, *Challenger Brachyura*, p. 280 (= *Liriopsea*, Gay, *Hist. Fis. Chile*, pt. III. *Zool.* p. 158).

\**Hymenicus*.

\**Hymenosoma*, Leach, Milne Edwards, *Hist. Nat. Crust.* II, 35: Miers, *Challenger Brachyura*, p. 279.

*Rhynchoplax*, Stimpson, *Proc. Ac. Nat. Sci. Philad.* 1858, p. 109.

\**Trigonoplax*.

### Family GRAPSIDÆ, Dana.

#### Subfamily I. GRAPSINÆ, Dana (pt.).

\*??? *Epigrapsus*.

\**Geograpsus*.

\**Goniopsis*, De Haan, *Faun. Japon. Crust.*, p. 33 (pt.): Miers, *Challenger Brachyura*, p. 266.

\**Grapsus*.

\**Leptograpsus*, Milne Edwards, *Ann. Sci. Nat., Zool.*, (3) XX, 1853, p. 171: Miers, *Challenger Brachyura*, p. 257 (sub-genus of *Grapsus*).

\**Metopograpsus*.

*Orthograpsus*, Kingsley, *Proc. Ac. Nat. Sci. Philad.* 1880, p. 194 (sub-genus of *Grapsus*).

\**Pachygrapsus*.

*Perigrapsus*, Heller, Verh. zool.-bot. Ges. Wien, XII, 1862, p. 522, and Novara Crust. p. 48.

## Subfamily II. VARUNINÆ, nov.

? *Acmaeopleura*, Stimpson, Proc. Ac. Nat. Sci. Philad., 1858, p. 105.

\**Brachynotus*, De Haan, Faun. Japon., Crust., p. 34, 1835: Miers, Challenger Brachyura, p. 264 (= *Heterograpsus*, Lucas, Expl. Sci. Algerie, Anim. Artic. I, p. 18, 1849: = *Hemigrapsus*, Dana, Amer. Journ. Sci. (2) XII, 1851, p. 288, and U. S. Expl. Exp., Crust., pt. I. p. 348).

\**Cyrtograpsus*, Dana, Amer. Journ. Sci. (2) XII, 1851, p. 288, and U. S. Expl. Exp., Crust., pt. I, p. 351.

\**Eriochir*, De Haan, Faun. Japon. Crust. p. 32.

*Euchirograpsus*, A. Milne Edwards, Bull. Mus. Comp. Zool., VIII, 1880-81, p. 18: and Milne Edwards and Bouvier "Hirondelle" (Monaco) Crust., Brachyures et Anomures, p. 46.

*Glyptograpsus*, S. I. Smith, Trans. Connect. Acad. II, 1871-73, p. 153.

\**Planes*, Leach, Malac. Pod. Brit., Expl. of pl. xxvii, figs. 1-3, 1815 (= *Nautilograpsus*, Milne Edwards, Hist. Nat. Crust. II, 89, 1837.)

*Platychiograpsus*, de Man, Zool. Anz. 1896, p. 292, and Mitteil. Nat. Mus. Hamburg, XIII, 1896, p. 95.

*Platygrapsus*, Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 104: Miers, Challenger Brachyura, p. 263 (= *Platynotus*, De Haan, Faun. Japon., Crust., p. 34).

\**Pseudograpsus*, Milne Edwards, Hist. Nat. Crust. II, 81: Miers, Challenger Brachyura, p. 261 (= *Pachystomum*, Nauck, Zeits. Wiss. Zool. XXXIV, 1880, p. 67).

\**Ptychognathus* (= *Gnathograpsus*, A. M. Edw. = *Cælochirus*, Nauck).

\**Pyxidognathus*.

*Utica*, White, P. Z. S. 1847, p. 85, and Ann. Mag. Nat. Hist., XX, 1847, p. 206.

\**Varuna* (= *Trichopus*, De Haan).

## Subfamily III. SESARMINÆ, Dana.

\**Aratus*, Milne Edwards, Ann. Sci. Nat., Zool., (3) XX, 1853, p. 187.

\**Chasmagnathus*, De Haan, Faun. Japon., Crust., p. 27 (= *Paragrapsus*, Milne Edwards, Ann. Sci. Nat., Zool., (3) XX, 1853, p. 195).

\**Clistocœloma*.

\**Cyclograpsus*, Milne Edwards, Hist. Nat. Crust., II, 77, 1837  
(= *Gnathochasmus*, MacLeay, in Smith's Ill. Ann. S. Afr. p. 65, 1838).

\**Helice*, De Haan, Faun. Japon., Crust., p. 28: Miers, Challenger Brachyura, p. 268.

\**Metaplastax* (= *Rhaconotus*, Gerst.).

\**Metasesarma*.

\**Metopaulias*, Mary J. Rathbun, P. U. S. Nat. Mus. XIX, 1897, p. 144.

\**Sarmatium* (= *Metagrapsus*, Edw.).

\**Sesarma* (= *Holometopus*, Edw.).

#### Subfamily IV. *PLAGUSIINÆ*, Dana.

\**Liolophus* (= *Acanthopus*, De Haan).

\**Plagusia*.

#### Family *GEOCARCINIDÆ*, Dana.

\**Cardiosoma* (= *Discoplax*, A. M. Edw.).

\**Epigrapsus*.

\**Gecarcinus*, Leach, Trans. Linn. Soc. XI, 1815, p. 322: Miers, Challenger Brachyura, p. 217.

\**Pelocarcinus* (= *Gecarcoidea*, Edw., = *Hylæocarcinus*, W.-M., = *Limnocarcinus*, de Man).

*Uca*, Latr., Encycl. Méthod. X, p. 685: Milne Edwards, Hist. Nat. Crust. II, 21.

#### Family *PALICIDÆ*, Rathbun (name only).

\**Palicus* (= *Cymopolia*).

\**Grossotonotus*, A. Milne Edwards, Nouv. Archiv. du Mus. IX, 1873, p. 282, and Journ. Mus. Godeffroy, I, 1873, p. 258.

#### Family *PTENOPLACIDÆ*, Alcock.

\**Ptenoplax*.

#### Family I. *GONOPLACIDÆ*, Dana.

##### Subfamily i. *PSEUDORHOMBILINÆ*, Alcock.

##### *Key to the Indian Genera.*

I. Front with the edge cut straight and square, never curved, often prominent:—

1. The fronto-orbital border, though extensive, is much less than the greatest breadth of the carapace, so that the antero-lateral borders of the carapace have



- a distinctly Cancroid arch: the carapace is usually much broader than long:—
- i. Dactyli of last pair of legs styliform ..... PSEUDORHOMBILA.
  - ii. Dactyli of last pair of legs compressed and ciliated:—
    - a. Antero-external angle of merus of external maxillipeds not particularly produced:—
      - a. Carapace transversely quadri-lateral, its antero-lateral borders with few teeth ..... CARCINOPLAX.
      - β. Carapace transversely elliptical, its antero-lateral borders with 5 or 6 teeth ..... CATOPTRUS.
    - b. Antero-external angle of merus of external maxillipeds strongly produced outwards: last pair of legs sometimes paddle-like..... LIBYSTES.
2. The fronto-orbital border is not so very much less than the greatest breadth of the carapace in extent, so that the antero-lateral borders of the carapace are either slightly arched or nearly straight: the carapace is broader than long but is not conspicuously transverse:—
- i. The antennal flagellum stands loosely in orbital hiatus:—
    - a. Carapace deepish, rather markedly transverse: the meri of the legs with a spine or spines on the anterior border ... PSOPHETICUS.
    - b. Carapace shallow, depressed, and flat, little broader than long:—
      - a. Legs spiny ..... PLATYPILUMNUS.
      - β. Legs unarmed..... PILUMNOPLAX.
  - ii. A process of the basal antenna-joint completely fills up and closes the orbital hiatus, entirely excluding the antennal flagellum ..... EUCRATE.
- II. Front with the edge slightly but distinctly curved, never cut straight and square; carapace and appendages in all the Indian species tomentose and hairy ..... LITOCURA.

### EUCRATE, De Haan.

*Eucrate*, De Haan, Faun. Japon. Crust. p. 36: de Man, Journ. Linn. Soc., Zool., 1887-88, p. 88: Ortmann, Zool. Jahrb., Syst. VII. 1893-94, p. 685.

*Heteroplax*, Stimpson, Proc. Ac. Nat. Sci. Philad. 1853 (1859) p. 94.

Carapace deepish, subquadri-lateral, a little broader than long, smooth and with little or no distinction of regions, convex fore and aft, very slightly so from side to side.

The extent of the fronto-orbital border is not much less than the greatest breadth of the carapace, the antero-lateral borders therefore, which are toothed, are short and but slightly arched. Front square-cut and straight, well delimited from the well-defined supra-orbital angles, usually notched or grooved in the middle line, about a third the breadth of the carapace.

Upper border of orbit with two distinct sutures. The orbital hiatus is compactly filled and closed by a process of the basal antenna-joint, so that the antennal flagellum, which is of good length, lies entirely outside the hiatus. The antennules fold transversely.

Buccal cavern square, completely closed by the external maxillipeds, the flagellum of which articulates with the inner angle of the merus. Efferent branchial channels of palate well defined.

Chelipeds subequal, much more massive and shorter, or not much longer, than the legs.

Legs slender, unarmed; the propodite and dactylus of the last pair are compressed and are usually, but not always, somewhat broadened.

In both sexes all seven abdominal segments are distinct, and in the male the third segment covers the whole width of the sternum between the bases of the last pair of legs.

*Distribution*: Indo-Pacific (Indian, Australian and Japanese).

Following de Man and Ortmaun, I restrict the genus *Eucrate* to those species in which the orbital hiatus is completely stopped-up by a process of the basal antenna-joint.

*Key to the Indian species of the genus Eucrate.*

- I. Antero-lateral borders of the carapace cut into four teeth (including the outer orbital angle) all of which are distinct: dactylus of last pair of legs distinctly palmulate: front grooved or notched in the middle line:—
  1. Carapace nearly smooth..... *E. crenata*.
  2. Carapace with some short transverse ridges in its antero-lateral part..... *E. crenata* var. *affinis*.
- II. Antero-lateral borders cut into four teeth (including the orbital angle) of which the 2nd and 4th are hardly distinguishable: front with the median notch almost obsolete: dactylus of last pair of legs palmulate ..... *E. crenata* var. *dentata*.
- III. Antero-lateral borders cut into three teeth (including the orbital angle): dactylus of last pair of legs almost styliform ..... *E. pseudodentata*.

1. *Eucrate crenata*, De Haan.

*Cancer (Eucrate) crenatus*, De Haan, Faun. Japon. Crust. p. 51, pl. xv. fig. 1.

*Eucrate crenata*, Ortmann, Zool. Jahrb., Syst., VII. 1893-94, p. 688.

? *Pilumnoplax sulcatifrons*, Stimpson, Proc. Ac. Nat. Sci. Philad. 1858 (1859), p. 93; Tozzetti, 'Magenta' Crust. p. 102, pl. vii. fig. 2.

Carapace smooth, its length about five-sixths of its breadth. Front not quite a third the breadth of the carapace, notched and grooved in the middle line. Major diameter of orbit about half the width of the front.

Antero-lateral borders of carapace cut into 4 bluntish teeth, the middle two of which are the largest: a short ridge runs on to the dorsum of the carapace from the last tooth.

Chelipeds less than twice the length of the carapace, not much longer than the legs, especially in the female: one or two teeth at the far end of the upper border of the arm, and one at the inner angle of the wrist: hand rather short and squat, the fingers, which are stout, are a little longer than the palm: there is a characteristic patch of fur at the far end of the upper surface of the wrist.

Legs smooth, the last 3 joints more or less ciliated: in the 4th (last) pair the propodite and dactylus are broader and more compressed than in the other legs.

In the Indian Museum are 3 specimens from the Andamans and 1 from Madras (besides 3 from Hongkong).

The carapace of the largest specimen is 10 millim. long and 12 millim. broad.

2. *Eucrate crenata* var. *affinis*, Haswell.

*Eucrate affinis*, Haswell, P. L. S., N. S. Wales, VI. 1881-82, p. 547 and Cat. Austral. Crust. p. 86: de Man, Journ. Linn. Soc., Zool. XXII. 1887-88, p. 89, pl. v. fig. 5.

? *Pseudorhombila sulcatifrons*, var. *australiensis*, Miers, Zool. H. M. S. Alert, p. 242, pl. xxiv. fig. c.

Differs from typical *E. crenata*, specimens of the same sex and of approximately the same size compared, only in the following characters:—

(1) the carapace is more sculptured, for besides the short transverse ridge on the dorsum of the carapace that runs from the last tooth of either antero-lateral border, there are similar ridges running (a) from the 2nd tooth of either antero-lateral border, parallel with the orbit, and (b) parallel with the front, near the anterior limit of the gastric region; there is also a beaded ridge running parallel with either postero-lateral border:

(2) the patch of fur on the wrist may be smaller :

A single specimen from Mergui (Anderson collection) has the carapace 12 millim. long and 15 millim. broad.

In a large series of specimens these distinctions would probably fail.

### 3. *Eucrate crenata* var. *dentata*.

? *Heteroplas dentatus*, Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, (1859), p. 94 : A. O. Walker, Journ. Linn. Soc. Zool. XX. 1886-1890, p. 110.

Differs from the typical *E. crenata*, only in the following particulars :—

(1) the front is entire, the median notch being inconspicuous or absent :

(2) the outer orbital angle and the third tooth of the antero-lateral border are large and acute, while the 2nd and 4th teeth are quite inconspicuous.

In the Indian Museum are two small specimens, one from Palk Strait (the other from Hongkong).

### 4. *Eucrate sexdentata*, Haswell.

*Eucrate sexdentata*, Haswell, P. L. S., N. S. Wales, VI. 1881-82, p. 548, and Cat. Austral. Crust. p. 86.

? *Pseudorhombila vestita* var. *sexdentata*, Miers, Zool. 'Alert,' p. 240, pl. xxiv. fig. B, and Challenger Brachyura, p. 229.

Differs from *E. crenata* in the following particulars :—

(1) the only ridges on the carapace are two exceeding faint ones running parallel with the postero-lateral borders :

(2) the antero-lateral borders are cut into 3 teeth, of which the last is spine-like :

(3) the median emargination of the front is much less distinct :

(4) the chelipeds are about  $1\frac{3}{4}$  times the length of the carapace and are decidedly shorter than the legs : there is only one distinct tooth near the far end of the upper border of the arm : the tooth at the inner angle of the wrist is very large and acute :

(5) the propodite and dactylus of the last pair of legs are not broader than those of the other legs.

In the Indian Museum is a single male from the Gulf of Martaban, 20 fms. The carapace is 11.5 millim. long and 13.5 millim. broad.

### CARCINOPLAX, Edw.

*Carcinoplas*, Milne Edwards, Hist. Nat. Crust. II. 60, and Ann. Sci. Nat., Zool.,

(3) XVIII. 1853, p. 164 : Ortman, Zool. Jahrb. Syst., &c., VII. 1893-94, p. 685.

*Curtonotus*, De Haan, Faun. Japon. Crust., p. 20 (*nom. preocc.*).

The chief differences between this genus and *Eucrate* are that (1)

the carapace is very much broader, and its antero-lateral borders are much more arched, the fronto-orbital border being relatively much less extensive; (2) the supra-orbital angles are almost merged in the front, and the median notch of the front is almost obsolete; and (3) the orbital hiatus is not stopped up by any process of the basal antenna-joint.

Carapace deepish, subquadrilateral, usually much broader than long, smooth and with little or no distinction of regions, convex fore and aft, very slightly so from side to side.

The extent of the fronto-orbital border is much less than two-thirds the greatest breadth of the carapace, and the antero-lateral borders, which are toothed, are well arched. Front square-cut and straight, faintly notched or longitudinally grooved in the middle line, not very distinctly demarcated from the supra-orbital angles, from a third to a fourth, or less, the width of the carapace.

The upper border of the orbit is sinuous and may, or may not, be marked by a single faint suture line. The basal antenna joint is short and the antennal flagellum stands loosely in the open orbital hiatus. The antennules fold transversely.

Buccal cavern, palate, and external maxillipeds as in *Eucrate*.

Chelipeds subequal, much more massive and sometimes, in the adult, much longer than the legs.

Legs slender, unarmed; in the last pair the propodite and dactylus are compressed and decidedly broadened for swimming.

In both sexes all seven abdominal segments are distinct, and in the male the third segment covers the whole width of the sternum between the bases of the last pair of legs.

*Distribution* : Indo-Pacific (Indian, Japanese, Californian).

I exclude from the genus *Carcinoplax* those species, e.g., *setosa* and *integra*, which have the edge of the front turned down and arched: these it seems to me are better associated with *Litochira*.

*Key to the Indian species of the genus Carcinoplax.*

- I. The long diameter of the orbit is nearly three-fourths the width of the inter-orbital space: a spine or tooth at the outer angle of the wrist. Chelipeds in the adult male very much longer than the legs ... .. *C. longimanus*.
- II. The long diameter of the orbit is about half the width of the inter-orbital space: no spine or tooth at the outer angle of the wrist. Chelipeds rather shorter than the legs ... .. *C. longipes*.

5. *Carcinoplax longimanus*, De Haan.

*Cancer* (*Curtonotus*) *longimanus*, De Haan, Faun. Japon. Crust. p. 50, pl. vi. fig. 1.

*Carcinoplax longimanus*, Milne Edwards, Ann. Sci. Nat. Zool. (3) XVIII. 1852, p. 164; Ortmann, Zool. Jahrb., Syst., VII. 1893-94, p. 688.

Carapace, length a little more than two-thirds its breadth, its surface (like that of the chelipeds) finely frosted: in the young the hepatic are obscurely delimited from the branchial and gastric regions and are very slightly tumescent.

Front proper about two-ninths the greatest breadth of the carapace, very faintly notched in the middle line. its free edge longitudinally grooved.

Orbits shallow, their major diameter more than two-thirds the width of the front: borders of orbit finely beaded, the upper border sinuous but entire.

Antero-lateral borders of carapace not much more than half the length of the postero-lateral, well arched, armed with 3 teeth or tubercles (including the outer orbital angle) which become much worn away in adults.

Chelipeds subequal, massive, varying in length with increase in age—from 2 or  $2\frac{1}{2}$  times the length of the carapace in females and young males to 4 times and more the length of the carapace in old males, the palm being the principal joint in which the lengthening takes place. There is a spine or tooth in the distal half of the upper surface of the arm, and one at either angle (inner and outer) of the wrist: a blunt crest, ending in a blunt tooth, traverses the inner surface of the palm.

The legs are long: the 3rd pair, which are slightly the longest, are a little more than twice the length of the carapace. The last two joints—as also the anterior border of the carpus—of all the legs are plumose.

In the Indian Museum are 2 specimens from the Gulf of Martaban and the Andaman Sea 53 and 60 fathoms, (besides a large male from Japan).

In spirit the colour is a light reddish ochre, the fingers uncoloured.

6. *Carcinoplax longipes* (Wood-Mason).

*Nectopanope longipes*, Wood-Mason, Ann. Mag. Nat. Hist., March, 1891, p. 262: Alcock and Anderson, Ill. Zool. Investigator, Crust. pl. xiv. fig. 7.

*Carcinoplax longipes*, Alcock, Investigator Deep-Sea Brachyura, p. 71.

Carapace, length more than three-quarters its breadth, the regions barely indicated.

Front proper about a third the greatest breadth of the carapace, remarkably prominent, as faintly as possible notched in the middle line.

Orbits shallow, their upper border sinuous but entire, their major diameter about half the width of the front. Eyes small.

Antero-lateral borders of carapace not two-thirds the length of the postero-lateral, moderately arched, armed with two pro-curved spine-like teeth, and with a small blunt denticle just behind the ill-defined orbital angle.

Chelipeds twice the length of the carapace; the arm has a denticle beyond the middle of the upper border, and there is a strong spine—with sometimes a secondary spinule at its base—at the inner angle only of the wrist.

The legs are long and have the dactylus well plumed and the 2 preceding joints more scantily hairy: the third pair, which are slightly the longest, are nearly  $2\frac{1}{2}$  times the length of the carapace: though the terminal joints of the fourth (last) pair are compressed they are not so subfoliaceous as those of *C. longimanus*.

In the Indian Museum are 20 specimens from the Andamans 220 to 290 fathoms and off Travancore, 430 fathoms.

In the largest specimen the carapace is 14 millim. long and 17 millim. broad.

In spirit the colour is white with a faint pink tinge, the fingers blackish-brown.

#### 7. *PSEUDORHOMBILA*, Edw.

*Pseudorhombila*, Milne Edwards, Hist. Nat. Crust. II. 59, and Ann. Sci. Nat., Zool., (3) XVIII. 1852, p. 164.

The only particulars in which *Pseudorhombila* differs from *Carcinoplax* are that the regions of the carapace are better defined, that the square-cut front is more distinctly bilobed, that the supra-orbital border has two distinct sutures, and that the dactyli of the last pair of legs are styliiform.

The only specimen in the Indian Museum that is perhaps referable to this genus is too small and too much damaged for description: it is from the Andamans.

#### LIBYSTES, A. M. Edw.

*Libyestes*, A. Milne Edwards, Ann. Soc. Entom. France, (4) VII. 1867, p. 285, and Nouv. Archiv. du Mus. IV. 1868, p. 84.

This genus unites *Carcinoplax* with *Catoptrus*. It chiefly differs

from *Carcinoplax* in having (1) a much shorter and broader carapace, (2) a much shorter and broader buccal cavern, with external maxillipeds that have the antero-external angle of the merus remarkably produced outwards, and (3) the 3rd to 5th abdominal terga of the male fused together. From *Catoptrus* it chiefly differs (1) in having the carapace more subquadrilateral than elliptical, and (2) in the curious *Amphitrite*-like form of the external maxillipeds.

Carapace deepish, subquadrilateral or subelliptical, vastly broader than long, with little or no distinction of regions, convex fore and aft, slightly so from side to side.

The extent of the fronto-orbital border is vastly less than the greatest breadth of the carapace, so that the antero-lateral borders, which may be toothed or entire, have a Cancroid-like curve. Front square-cut and quite straight, not well separated from the supra-orbital angles, slightly notched in the middle line, a third or less the greatest breadth of the carapace.

Orbits shallow, their upper border entire. The basal antenna-joint is short, and the antennal flagellum stands loosely in the orbital hiatus. The antennules fold transversely.

Buccal cavern square-cut, much broader than long; the efferent branchial canals of the palate very well defined. The merus of the external maxillipeds is short and broad and has the external angle much produced, as in many species of *Neptunus*.

Chelipeds subequal, much more massive and longer than the legs; the hands however, which are somewhat tumid, are unequal in the adult.

Legs slender, unarmed: in the Indian species the last pair are almost as paddle-like as those of the typical swimming-crabs of the Portunid family.

In the male the abdomen covers the whole width of the sternum between the last pair of legs, and the 3rd-5th abdominal terga are fused together.

The sternal canals of the male are more perfect than in any other Gonaplaceoid known to me.

#### *Key to the Indian species of Libystes.*

- I. Antero-lateral borders of the carapace serrated almost exactly like those of *Catoptrus nitidus* ... .. *L. Edwardsi*.
- II. Antero-lateral borders of the carapace entire ... .. *L. Alphonsi*.

*Distribution*: Indo-Pacific (Madagascar to Sandwich Is.).



8. *Libystes Edwardsi*, n. sp.

Carapace, length about four-sevenths of the breadth, finely pitted under lens, somewhat granular near the antero-lateral borders: an angular eminence near either posterior angle and a slight concavity of the postero-lateral part of the lateral epibranchial regions give the carapace a somewhat quadrilateral cast.

Front a good deal less than a third the breadth of the carapace, perfectly straight, faintly notched in the middle line. Eyes small.

Antero-lateral borders of the carapace with 5 or 6 granular denticles followed by a sharp procurved spine.

The chelipeds have the hands unequal in the adult. They are more than three times the length of the carapace and are smooth and unarmed. The fingers are slender and hooked at tip, especially in the smaller hand: they are a good deal longer than the palm in the smaller hand, and about as long as the palm in the larger hand. On the immobile finger of the smaller hand there are several irregular enlarged teeth. [In the young, as in *Catoptrus*, the hands are nearly equal, and the fingers of both hands are equally long and slender].

The legs are slender and the longest pair are not much more than twice the length of the carapace. The last 3 joints of the last pair form typical swimming paddles.

An apparently adult specimen from the Persian Gulf and 3 young from the Andamans are in the Indian Museum.

The carapace of the large speciemu is 8 millim. long and 14 millim. broad.

9. *Libystes Alphonsi*, n. sp.

Differs from *L. Edwardsi* in the following particulars:—

(1) the carapace, though of the same proportions, is more quadrilateral and more convex fore and aft, and the eminences at the posterior angles are wanting:

(2) the antero-lateral borders of the carapace are smooth and entire:

(3) the front is more deflexed and more distinctly divided in the middle line:

(4) the chelipeds (in the young) are about  $2\frac{1}{2}$  times the length of the carapace and are nearly equal and similar: the fingers are hardly as long as the palm:

(5) The last 3 joints of the last pair of legs are much broadened and compressed, but are not such unmistakable paddles as those of *L. Edwardsi*.

In the Indian Museum is a single specimen from the Andamans : its carapace is 4 millim. long and 7 millim. broad.

This species differs but little, except in the sub-quadrilateral shape of the thorax, from the *Libystes nitidus* described and figured by M. A. Milne-Edwards.

#### CATOPTRUS, A. M. Edw.

*Catoptrus*, A. Milne Edwards, Ann. Sci. Nat. Zool. (5) XIII. 1870, p. 82 : Ortmann, Zool. Jahrb., Syst. VII. 1893-94, p. 685.

*Goniocaphyra*, de Man, Archiv für Naturges. LIII. 1887, i. p. 339.

Carapace transversely elongate-elliptical, without distinction of regions, moderately convex in both directions.

The extent of the fronto-orbital border is vastly less than the greatest breadth of the carapace, the antero-lateral borders, which are serrated, are therefore well curved. Front straight, slightly notched in the middle line, not distinctly separated from the supra-orbital angles, less than a third the greatest breadth of the carapace.

Orbits shallow, their upper border entire. The antennal flagellum, which is of good length, stands in the orbital hiatus. The antennules fold transversely.

Buccal cavern, palate, and external maxillipeds as in *Eucrate*.

Chelipeds much as in *Libystes*. Legs as in *Libystes*, except that the last pair, though they have the dactylus compressed and ciliated, are never paddle-like.

Abdomen as in *Libystes*.

*Distribution* : Indo-Pacific (Mauritius to Samoa).

*Catoptrus* really differs from *Libystes* only in the form of the merus of the external maxillipeds and of the last pair of legs, which are not paddle-like as they are in one species of *Libystes*.

#### 10. *Catoptrus nitidus*, A. M. Edw.

*Catoptrus nitidus*, A. Milne Edwards, Ann. Sci. Nat., Zool., (5) XIII. 1870, p. 82 : de Man, Notes Leyden Mus. XII. 1890, p. 67 : Ortmann, Zool. Jahrb., Syst., VII. 1893-94, p. 687.

*Goniocaphyra truncatifrons*, de Man, Archiv für Nat. LIII. 1887, p. 339, pl. xiv. fig. 1, and Notes Leyden Mus. XII. 1890, p. 67.

*Goniocaphyra* sp., Zehntner, Rev. Suisse Zool. II. 1894, p. 163, pl. viii. fig. 12, 12a.

Carapace, length less than two-thirds its breadth, perfectly smooth and shining except for some fine granulation near the antero-lateral borders.

Front about a third the greatest breadth of the carapace, faintly notched and grooved in the middle line.

Antero-lateral borders cut into five teeth followed by a procurved spine.

Merus of external maxillipeds having the external angle very slightly produced.

Chelipeds unequal, much longer and more massive than the legs, the larger one about three times the length of the carapace: they are smooth and unarmed, except that the anterior border of the arm is finely serrulate and that one of the serrations at either the near or far end (rarely at both) is enlarged to form a spine. In the smaller cheliped the fingers are slender hooked and finely toothed, and are rather longer than the slightly swollen palm: in the larger cheliped they are stouter and more coarsely toothed and are shorter than the swollen palm.

Legs slender, the longest pair are hardly more than twice the length of the carapace; the dactylus of all, though compressed, is slender.

In the Indian Museum are 16 specimens from off Ceylon 34 fathoms (besides 3 from Mauritius and 2 from Samoa).

In the largest specimen (from Mauritius) the carapace is 9.5 millim. long and 14.5 millim. broad. The Indian specimens, though they include egg-laden females, are much smaller.

#### PSOPHETICUS, Wood-Mason.

*Psopheticus*, Wood-Mason, Admin. Rep. Marine Survey of India, 1890-91, p. 20 (name only): Alcock, Investigator Deep-Sea Brachyura, p. 72.

*Psopheticus* in several respects connects *Carcinoplax* and *Pseudorhombila* with *Eucrate*, and hence serves to emphasize the opinion of Miers as to the closeness of the ties that connect the three latter genera.

As in *Pseudorhombila* and *Carcinoplax*, the carapace is much broader than long and the orbital hiatus is open. As in *Pseudorhombila*, the dactylus of the last pair of legs is styliform. As in *Eucrate*, the fronto-orbital border occupies almost all the breadth of the carapace.

Carapace deepish, quadrilateral or subquadrilateral, a good deal broader than long, with the regions hardly defined, moderately convex fore and aft, flat from side to side.

Fronto-orbital border little, if at all, less than the greatest breadth of the carapace, the antero-lateral borders of the carapace therefore—which are short—are either very slightly arched or are in the same

straight line with the postero-lateral borders. Front square-cut, straight, prominent, entire, not well delimited from the supra-orbital angles, a third the breadth of the carapace, or a little less.

Upper border of orbit very sinuous and with a single faint short suture line. The antennal flagellum, which is of good length, stands loosely in the orbital hiatus. The antennules fold transversely.

Mouth and external maxillipeds as in *Eucrate*.

Chelipeds much stouter than the legs. The legs end in a slender styliform dactylus, and have one or many spines on the anterior border of the merus.

In both sexes the abdomen consists of seven separate segments, and in the male the third segment covers the whole width of the sternum between the last pair of legs.

*Distribution* : Andaman Sea.

*Key to the (Indian) species of Psopheticus.*

- I. Carapace quite quadrilateral, the fronto-orbital border being equal to the greatest breadth of the carapace :  
meropodites of legs with numerous spines ... .. *P. stridulans*.
- II. Carapace subquadrilateral, the fronto-orbital border being about three-fourths its greatest breadth : mero-  
podites of legs with a single spine ... .. *P. insignis*.

11. *Psopheticus stridulans*, Wood-Mason.

*Psopheticus stridulans*, Wood-Mason, Illustrations of the Zoology of the Investigator, Crustacea, pl. v, fig. 1. (1892): Alcock, Ann. Mag. Nat. Hist., May 1894, p. 402; and Investigator Deep-Sea Brachyura, p. 73.

Carapace quite quadrilateral, three-fourths as long as broad, smooth and polished, crossed transversely in its posterior half by a broad groove which is continued obliquely across the pterygostomian regions to the angles of the mouth.

Owing to the large size of the eye and orbit, the extent of the fronto-orbital border is equal to the greatest breadth of the carapace.

A thin sharp prominent tooth at the outer orbital angle, and an obliquely-prominent spine at the junction of the antero-lateral and postero-lateral borders.

The subocular and subhepatic regions are inflated, and together form a granular eminence against which a strong spine on the upper border of the arm can be brought to play, producing a sound. Hence the names *Psopheticus* and *stridulans*.

The major diameter of the reniform eye is between a sixth and a seventh the breadth of the carapace; though the orbit does not conceal the eye its edges are well and cleanly cut.

The chelipeds in the adult male are a little more, in the adult female a little less, than twice the length of the carapace, but are slightly shorter than the legs: they are smooth and polished, as also are the legs. The arm has a strong upstanding claw-like tooth near the middle of its upper border, one or two spinules near the far end of the outer border, and a spinule near the far end of the inner border: the wrist has both the inner and the outer angles spiniform.

The third pair of legs, which are slightly the longest of the four, are rather more than two-and-a-half times the length of the carapace. In all, the anterior edge of the meropodites is armed with spines and the same edge of the carpopodites with spinules—these being least numerous and least distinct in the case of the first pair.

Colours in glycerine: chelipeds and legs rather dusky red; carapace dusky red behind the transverse groove—which forms a very sharply-defined red band—livid red, or almost violet, in front of it; eyestalks almost purple, eyes purplish-black. Eggs in life magenta.

The carapace of the largest male is 15 millim. long and 20 millim. broad.

Only known, so far, from the Andaman Sea: 2 males and a female from 173 fms., 2 males and a female (Types of the species and genus) from 183–220 fms., 7 females (3 with eggs) from 185 fms., a male and 4 females from 370–419 fms.

## 12. *Psopheticus insignis*, n. sp.

Carapace subquadrilateral, the antero-lateral borders being slightly arched, about three-fourths as long as broad, smooth, crossed transversely by two very low and indistinct ridges—one (convex forwards) between the lateral epibranchial spines, the other at the level of the post-cardiac region. The extent of the fronto-orbital border is about three-fourths the greatest breadth of the carapace.

There is a bluntish tooth at the outer orbital angle, and an obliquely prominent spine at the junction of the antero-lateral and postero-lateral borders, the edge of the carapace between the two being granular.

Eye small, subglobular, its diameter being hardly a tenth the greatest breadth of the carapace.

Chelipeds more than  $2\frac{1}{2}$  times as long as the carapace and decidedly longer than the legs: they are unarmed except for a small tooth or spinule at the outer angle of the wrist.

The meropodites of the legs have the anterior border sharply granular, and in the case of the last three pair of legs there is a spine near the far end of this border. The longest pair of legs are hardly  $2\frac{1}{2}$  times as long as the carapace.

Two specimens, from the Gulf of Martaban, 60 and 67 fms.

The carapace of the largest is 13 millim. long and 19 millim. broad.

Colours in glycerine, reddish: in the middle of the carapace is a large deep-red shield with a milk-white edge and centre.

This species closely connects *Isopheticus* with *Carcinoplax*.

### PILUMNOPLAX, Stimpson restr.

*Pilumnoplax*, Stimpson, Proc. Ac. Nat. Sci. Philad. 1858 (1859) p. 93: Miers, Challenger Brachyura, p. 225: Alcock, Investigator Deep Sea Brachyura, p. 74.

Carapace depressed, flat, a little broader than long, the regions very faintly indicated. Fronto-orbital border two-thirds, or more, the greatest breadth of the carapace: the antero-lateral borders, which are toothed, are slightly arched or oblique. Front square-cut, straight, rather prominent, more or less confluent with the supra-orbital angles, often notched or grooved in the middle line.

Supra-orbital border often with two fissures. The antennal flagellum, which is of good length, stands in the orbital hiatus. The antennules fold transversely, or nearly so.

Mouth and mouth-parts as in *Eucrate*.

Chelipeds either subequal or unequal, much more massive than the legs. Legs slender, their dactyli compressed.

The abdomen in both sexes is seven-jointed: in the male the 3rd segment covers the whole width of the sternum between the last pair of legs.

*Distribution*: Tropical and S. Atlantic (deep sea), Arabian Sea (deep), Japan, Fiji.

The species of *Pilumnoplax* are characterized by the flat, depressed carapace, which is also comparatively narrow and, owing to the prominence of the perfectly straight front, is subhexagonal in shape.

### 13. *Pilumnoplax americana*, Rathbun.

*Pilumnoplax americanus*, Mary J. Rathbun, Bull. Lab. Nat. Hist. Iowa, 1898, p. 283, pl. vii figs. 1, 2.

*Pilumnoplax Sinclairei*, Alcock, Investigator Deep Sea Brachyura, p. 74, pl. iii. fig. 1.

Carapace subquadrilateral, much depressed, a little more than three-quarters as broad as long, very finely frosted, perfectly bare, the regions fairly indicated.

Front horizontal, slightly prominent, square cut, grooved but not distinctly notched in the middle, more than a third the greatest breadth

of the carapace; its free edge is turned vertically downwards and rather deeply grooved from side to side.

The antero-lateral borders are not much more than half the length of the postero-lateral: they are thin and sharp, and are cut into three teeth, of which the first is broad and bicuspid and the other two are acute. On the postero-lateral borders, just behind the junction with the antero-lateral, is a denticle.

The eyes are small but well-formed, and are freely movable. The orbits conceal the retracted eyes to dorsal view: their upper margin is fissured near the middle, and the lower margin is slightly excavated just below the outer angle: the inner angle of the lower margin is not prominent, though dentiform.

The chelipeds in both sexes are very unequal, the larger one being not quite twice as long as the carapace; their surface, under the lens, is finely frosted: the inner angle of the wrist is strongly pronounced and is capped by a pair of acute teeth.

Legs moderately stout, unarmed, smooth, almost hairless: the third pair, which are somewhat the longest, are about two-and-a-half-times the length of the carapace. The dactyli are compressed-styliform.

Colours in spirit french-grey, fingers much darker grey.

A single female specimen, from off the Travancore coast 430 fms., has the carapace 13 millim. long and 16 millim. broad.

This species is closely related to *Pilumnoplax heterochir* (Studer) Miers, but is distinguished from it by the entire and more prominent front, by the absence of transverse markings on the carapace, by the longer legs, and by the smoothness of the chelipeds and legs.

From *Pilumnoplax abyssicola* Miers, which it also closely resembles, it is distinguished by the smooth carapace (to the naked eye), by the turned-down milled edge of the front, by the spinule on the postero-lateral border, by the fissured upper-margin of the orbit, and by the double spine at the inner angle of the wrist.

*Distribution*: Off Atlantic coasts of North America (Florida and Georgia) 440 and 70 to about 200 fms. Off Travancore coast 430 fms.

A single specimen from the latter locality is in the Indian Museum collection.

#### [*PLATYPILUMNUS*, Wood-Mason.

*Platypilumnus*, Wood-Mason MS., Alcock, Ann. Mag. Nat. Hist., May, 1894, p. 401: Journ. Asiatic Soc. Bengal, Vol. LXVII. pt. 2, 1898, p. 232: Investigator Deep Sea Brachyura, p. 62.

This genus, like so many of the preceding, has strong affinities with

the *Xanthidæ*: it may prove to belong to that family, where I have already, with reserve, placed it.

I may here, however, state that it closely resembles *Pilumnoplax*, having a flat, depressed, slightly transverse carapace. It differs from *Pilumnoplax* in the following particulars:—

(1) the front is more prominent, so that the carapace is more decidedly hexagonal:

(2) the fronto-orbital border is sharply serrated and the chelipeds and legs are profusely spiny:

(3) the external maxillipeds do not completely close the buccal cavern, but leave a wide gap between their anterior margin and the edge of the epistome:

(4) the dactyli of the legs are styliform.

*Distribution*: Andaman Sea.]

[*Platypilumnus gracilipes*, Wood-Mason.

*Platypilumnus gracilipes*, Wood-Mason MS., Alcock, Ann. Mag. Nat. Hist., May, 1894, p. 401: Ill. Zool. Investigator, Crust., pl. xiv. fig. 6: J.A.S.B. Vol. LXVII, pt. 2, 1898, p. 232: Investigator Deep Sea Brachyura, p. 63.

A description of the female (which is the only sex known) has been already given in this *Journal* (*loc. cit.*).

LITOCHIRA, Kinahan.

*Litochira*, Kinahan, Journ. Roy. Soc. Dublin, I. 1858, p. 121: Miers, Challenger Brachyura, p. 231.

? *Brachygrapsus*, Kingsley, Proc. Ac. Nat. Sci. Philad. 1880 (1881) p. 203.

Carapace and appendages in all the Indian species thickly tomentose and hairy.

Carapace deepish, either subquadrilateral and a good deal broader than long, or almost square, smooth, with little or no distinction of regions, flat, but declivous anteriorly. Fronto-orbital border not much less than, if not equal to, the greatest breadth of the carapace: antero-lateral borders short and if arched at all, very slightly so, and usually, but not always, with 2 or 3 teeth or spines.

Front not well delimited from the supra-orbital angles, its free edge deflexed and somewhat arched, never square-cut and laminae; more or less distinctly bilobed.

Upper border of orbit entire. The antennal flagellum, which is of good length, stands in the orbital hiatus. The antennules fold transversely, or nearly so.

Mouth and external maxillipeds as in *Eucrate*, &c.



Chelipeds subequal, more massive and usually shorter than the legs. The legs, including the dactyli, are compressed.

The abdomen of the male occupies the whole width of the sternum between the last pair of legs : in both sexes it consists of 7 segments.

I restrict the genus *Litochira* to those species which have the edge of the front turned down and distinctly arched as is shown in Kinahan's figure. These species fall into two groups, in one of which the carapace is a good deal broader than long, as in Kinahan's type, while in the other it is nearly square. Perhaps these two groups should be separated, though I do not recommend this course.

*Distribution* : S. Atlantic and Indo-Pacific (Cape to Australia).

*Key to the Indian species of Litochira.*

- I. Length of carapace about two-thirds the greatest breadth of the carapace and equal to the extent of the fronto-orbital border; the antero-lateral borders distinctly arched :—
  1. Antero-lateral borders of the carapace with three truncated teeth, exclusive of the orbital angle .. *L. angustifrons.*
  2. Antero-lateral borders with two distinct, though blunt, teeth ..... *L. setosa.*
  3. Antero-lateral borders with hardly any trace of lobulation—almost entire ... *L. integra.*
- II. Carapace more nearly square, the fronto-orbital border almost equal to its greatest breadth, so that the antero-lateral borders are almost in the same straight line with the postero-lateral borders or a very little curved :—
  1. Antero-lateral borders with two spines and one at the orbital angle : legs unarmed ..... *L. Beaumonti.*
  2. Antero-lateral borders with two spines : no spine at the orbital angle : meropodites of the legs with some spines ..... *L. quadrispinosa.*

14. *Litochira integra* (Miers).

*Carcinopias integra*, Miers, Zool. H. M. S. Alert, p. 513, pl. xlviii. fig. C : de Man, Journ. Linn. Soc., Zool., XXII, 1887-88, p. 93.

Length of the carapace about two-thirds its breadth and equal to the extent of the fronto-orbital border.

Antero-lateral borders arched, without spines, though when completely denuded they are granular and show faint but quite distinguishable traces of division into two lobules besides the orbital angle.

Chelipeds less than twice the length of the carapace and shorter than the legs, unarmed except for an indistinct blunt tooth near the

far end of the upper border of the arm : inner angle of wrist dentiform. Legs unarmed.

A single female from Mergui: its carapace is 6 millim. long and 9 millim. broad.

15. *Litochira setosa* (A. M. Edw.).

*Carcinoplax setosa*, A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 267, pl. xii. fig. 2: de Man, Archiv f. Naturges. LIII. 1887, i. p. 349, and Journ. Linn. Soc., Zool., XXII. 1887-88, p. 93.

The only essential difference between this species and the preceding is that the carapace here is a little more depressed and that the antero-lateral borders are cut into 2 blunt teeth besides the blunt orbital angle. The size is about the same.

In the Indian Museum are 16 specimens, from the Andamans and Mergui.

16. *Litochira angustifrons*, n. sp.

Carapace, length a little more than two-thirds the breadth. Fronto-orbital border nearly five-ninths the breadth of the carapace in extent. Antero-lateral borders arched, cut into 4 teeth (including the outer orbital angle) the edges and dorsal surface of which are granular: the first 3 teeth are sharply truncated, the fourth is subacute.

Chelipeds, in the adult male, nearly twice the length of the carapace and hardly shorter than the legs; in the female much less than twice the length of the carapace and markedly shorter than the legs. There is a lobule near the far end of the upper border of the arm, and the inner angle of the wrist is subacute.

Two specimens, from Bombay and Karachi. The carapace of the larger is 13 millim. long and 18 millim. broad.

This species appears to be closely related to *Pilumnoplax ciliatus* Stimpson.

17. *Litochira Beaumontii*, n. sp.

Carapace, length more than two-thirds the greatest breadth, nearly square. The extent of the fronto-orbital border is hardly less than the breadth of the carapace. The antero-lateral borders are hardly arched and are armed with 3 sharp spinules—including one at the outer orbital angle.

The chelipeds are much shorter than the legs and, like them, are unarmed, except that the inner angle of the wrist is dentiform. The longest (penultimate) pair of legs are more than  $2\frac{1}{2}$  times as long as the carapace.

In the Indian Museum are 4 specimens, from the Andamans and from off Ceylon 34 fms. The carapace of the type specimen is 5 millim. long and 7 millim. broad.

Colour in spirit, uniform yellow.

18. *Litochira quadrispinosa*, Zehntner.

*Litochira quadrispinosa*, Zehntner, Rev. Suisse de Zool. II. 1894, p. 171, pl. viii. figs. 11, 11b.

Differs from *L. Beaumontii* in the following particulars only:—

(1) the carapace is still more nearly square:

(2) there are 2 spines on the antero-lateral borders but none at the outer orbital angles:

(3) the inner border of the ischium and arm of the chelipeds is serrated, and the meropodites of the legs are armed with spines.

(4) the colouration is yellow, with a large purplish-brown horse-shoe behind the front, and with sinuous markings of the same colour on the lateral subfrontal and suborbital regions of the carapace: the greater part of the antennal flagella is of the same purplish-brown colour.

In the Indian Museum is a single specimen from the Andamans. the carapace is 4 millim. long and 5 millim. broad.

Subfamily ii. GONOPLACINÆ.

19. GONOPLEX, Leach.

*Gonoplax*, Leach, Trans. Linn. Soc. XI. 1815, pp. 309, 323, and Malac. Pod. Brit.: Desmarest, Consid. Gen. Crust. p. 124, and Dict. Sci. Nat. XXVIII. p. 243: De Haan, Faun. Japon. Crust., p. 19: Milne Edwards, Hist. Nat. Crust. II. 60, and Ann. Sci. Nat. Zool. (3) XVIII. 1852, p. 162: Dana, U. S. Expl. Exp. Crust. pt. I. p. 310: Bell, Brit. Stalk-eyed Crust. p. 129: Heller, Crust. Sudl. Europ. p. 102: Miers, Challenger Brachyura, p. 245.

*Rhombilia*, Lamarck (part), Hist. Nat. Anim. sans Vert. (2) V. p. 466: Latreille, Encyc. Méthod. X. p. 292.

Carapace subquadrilateral, with the antero-lateral angles acute and the lateral borders posteriorly convergent, a good deal broader than long, moderately convex, the regions but faintly indicated.

The front and orbits occupy the whole anterior border of the carapace: the front is square cut, laminar, and obliquely deflexed, and takes up between a third and a fourth of the anterior border of the carapace, the rest being taken up by the trench-like orbits.

Eyestalks long and slender: the antennules fold quite transversely beneath the front: the antennæ have a short basal joint and a slender flagellum of good length, standing in the orbital hiatus.

The buccal cavern is square and is well separated from the prominent epistome: the efferent branchial channels are not well defined. The external maxillipeds completely close the buccal cavern: their merus is square and carries the flagellum at the antero-internal angle.

Chelipeds in both sexes much more massive, and in the male very much longer, than the legs, which are long and slender.

The abdomen in both sexes consists of 7 separate segments: in the male the 3rd segment nearly but not quite covers the sternum between the last pair of legs.

*Distribution*: North-Eastern Atlantic coasts, Mediterranean basin; Persian Gulf; East Indian Archipelago.

In the Indian Museum there is a young female, lately received by myself from the Persian Gulf, of a species of *Gonoplax*. Apart from the shortness of the chelipeds it differs from *G. angulata*, of which we have several good specimens from Europe, only in wanting the terminal spine to the upper border of the meropodites of the legs.

### Subfamilies iii. & iv. RHIZOPINÆ & HEXAPODINÆ.

#### *Key to the Indian Genera.*

#### A. Four pairs of legs, besides the chelipeds (*Rhizopinæ*):—

##### 1. The antennular flagella can be completely retracted within the antennular fossæ:—

##### 1. The epistome is of good length fore and aft, it is not in any way confused with the palate but is commonly prominent and almost vertical:—

##### i. Eyes well formed, rarely deficient in pigment:—

- a. Eyes in all respects perfect: front straight, entire, from two-fifths to half the greatest breadth of the carapace: merus of the external maxillipeds nearly square.....

NOTONYX.

- b. Eyes either quite perfect or deficient in pigment: front slightly curved and notched in the middle, about a third the greatest breadth of the carapace: antero-external angle of the merus of the external maxillipeds much produced...

CERATOPLAX.

##### ii. Eyes obsolete or nearly so:—

- a. Carapace much broader than long, the postero-lateral borders parallel ...

TYPHLOCARCINUS.

- b. Carapace a little broader than long, the postero-lateral borders anteriorly-convergent .....

XENOPHTHALMODUS.

2. The epistome is short, sunken, and not boldly separated from the palate :—
- i. Eyes minute, orbits concealed beneath the anterior border of the carapace: merus of external maxillipeds with a sharp antero-external angle ..... SCALOPIDIA.
  - ii. Eyes obsolete or nearly so, orbits visible from above: antero-external angle of merus of external maxillipeds rounded off ..... TYPHLOCARCINODES.
- II. The basal joint of the antennules completely fills its fossa, into which the flagellum cannot therefore be retracted :—
1. Eyes small, but perfect: outer border of merus of external maxillipeds almost straight ..... HEPTHOPETTA.
  2. Eyes reduced to a speck of pigment: outer border of merus of external maxillipeds with a strongly convex bulge outwards ..... CAMATOPSIS.
- B. Only three pairs of legs besides the chelipeds, the last pair of other crabs not being represented even by a rudiment. The *vasa efferentia* of the male open on the 4th sternal segment (*Hexapodinae*) ..... LAMBDOPHALLUS.

### Subfamily iii. RHIZOPINÆ, Stimps.

NOTONYX, A. M. Edw.

*Notonyx*, A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 268: Miers, Challenger Brachyura, p. 235.

Carapace deepish, subquadrilateral with the antero-lateral angles rounded off, broader than long, perfectly nude smooth and polished, without any indication of regions, convex fore and aft and anteriorly declivous.

Fronto-orbital border a good deal more than three-fourths the greatest breadth of the carapace: antero-lateral borders short, entire, curved. Front straight, sublaminar, from two-fifths to half the breadth of the carapace.

Eyes small but well developed, the eyestalks movable, obpiriform: orbits in the usual marginal position. The antennules fold transversely in well formed pits. Basal antenna-joint short; the flagellum, which is of fair length, stands in the orbital hiatus.

Epistome well formed, nearly vertical: buccal cavern a little wider in front than behind. A slight hiatus between the external maxillipeds, the merus of which appendages is square and carries the flagellum at the antero-internal angle.

Chelipeds subequal, or a little unequal, smooth and polished, much

more massive and but little shorter than the legs: palm short and rather deep, with the lower border sharply carinate.

Legs smooth, unarmed, with a very few scattered lank hairs: dactyli styliform.

The abdomen in both sexes consists of 7 separate segments and does not nearly conceal the sternum between the last pair of legs.

*Distribution*: Indo-Pacific, from Fiji to the Persian Gulf.

*Key to the Indian species of Notonyx.*

- I. Carapace, length about three-fourths the breadth: merus of external maxillipeds about as long as the ischium ... *N. nitidus*.
- II. Carapace, length about five-sixths the breadth: merus of external maxillipeds much shorter than the ischium ... *N. vitreus*.

20. *Notonyx nitidus*, A. M. Edw.

*Notonyx nitidus*, A. Milne Edwards, Nouv. Archiv. du Mus. IX, 1873, p. 269, pl. xii. fig. 3: Miers, Challenger Brachyura, p. 236.

Carapace, length a little more than three-fourths the greatest breadth. Front between a third and two-fifths the breadth of the carapace. Orbits elongate. Merus of the external maxillipeds as long as the ischium.

A small denticle near the far end of the upper border of the arm: inner angle of wrist pronounced, but not acute.

Legs with some scattered hairs along the edges, the 3rd pair, which are slightly the longest, are about  $2\frac{1}{2}$  times the length of the carapace and nearly half again as long as the chelipeds.

In the Indian Museum is a single specimen from the Persian Gulf: its carapace is 8.5 millim. long and 11 millim. broad.

21. *Notonyx vitreus*, n. sp.

Carapace, length about five-sixths the greatest breadth, rather tumid. Front nearly half the breadth of the carapace. Merus of the external maxillipeds shorter than the ischium.

No denticle on the arm: inner angle of wrist blunt. Legs with hardly any hairs, otherwise resembling those of *N. nitidus*.

In the Indian Museum is a single specimen from the Andaman Sea, 53 fathoms: its carapace is 5 millim. long and 6 millim. broad.

CERATOPLAX, Stimpson.

*Ceratoplax*, Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 96: Miers, Challenger Brachyura, p. 238.

Carapace deep, subquadrilateral with the antero-lateral angles rounded off, a good deal broader than long, the regions very indistinctly

and incompletely indicated, strongly convex fore and aft and anteriorly declivous.

Fronto-orbital border about two-thirds the greatest breadth of the carapace: antero-lateral borders sharp, entire, curved: postero-lateral borders parallel.

Front about a third the greatest breadth of the carapace, its free edge slightly arched, notched in the middle line.

The orbits are in the usual position and the eyestalks are immovably fixed in them, but the eyes are fairly well formed, though they may be deficient in pigment. The antennules fold transversely in proper pits. The basal antenna-joint is short: the flagellum, which is of good length, stands in the orbital hiatus.

Epistome well formed and prominent: buccal cavern quadrilateral, slightly increasing in breadth from behind forwards, almost completely closed by the external maxillipeds, the merus of which has *the antero-external angle much produced* and carries the flagellum at the antero-internal angle.

Chelipeds subequal, more massive but decidedly shorter than the legs; the palm short, deep, and compressed.

Legs slender, unarmed, the 3rd pair the longest: dactyli styliform.

The abdomen in both sexes consists of 7 separate segments and does not nearly occupy the space between the last pair of legs.

*Distribution*: Indo-Pacific from the Bay of Bengal to Ecuador.

#### *Key to the Indian species of Ceratoplax.*

- I. Surface of carapace nude, eyes well pigmented: outer surface of palm polished and nearly smooth ... .. *C. ciliata*.
- II. Surface of carapace tomentose, eyes deficient in pigment: rows of vesiculous granules on the outer surface of the palm ... .. *C. hispida*.

#### 22. *Ceratoplax ciliata*, Stimpson.

*Ceratoplax ciliatus*, Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 96: A. O. Walker, Journ. Linn. Soc., Zool., XX. 1890, p. 110.

*Ceratoplax ciliata*, Miers, Challenger Brachyura, p. 234, pl. xix. fig. 3: Cano, Boll. Soc. Nat. Napol. III. 1889, p. 229.

Carapace, chelipeds and legs rather scantily fringed with hairs, but with a nude surface.

Carapace, length a little more than three-fourths the greatest breadth, sparsely punctate, the regions not distinguishable. Front about a third the greatest breadth of the carapace, its free edge slightly arched and notched in the middle line. Eyes well pigmented. Chelipeds decidedly shorter than the legs: inner angle of wrist sharp, but

not produced: outer surface of palm smooth and polished, except for a few depressed granules inferiorly. Third pair of legs not twice the length of the carapace.

In the Indian Museum is a single specimen from the Andaman Sea, 53 fms.

23. *Ceratoplax hispida*, n. sp.

Carapace, chelipeds and legs with a tomentose surface, and fringed with longer silky hairs.

Carapace, length a little less than three-fourths the breadth, when denuded its regions (and three gastric subregions) are just distinguishable, and its surface is pitted and its lateral margins granular. Front a little more than a third the greatest breadth of the carapace, its free edge decidedly arched and notched in the middle line. Eyes very deficient in pigment. Chelipeds (in the female—male unknown) much shorter than the legs: inner angle of wrist sharply dentiform; outer surface of palm with numerous rows of vesiculous granules. Third pair of legs two-and-a-half times the length of the carapace.

In the Indian Museum is a single specimen from Palk Straits: its carapace is 9 millim. long and 13 millim. broad.

TYPHLOCARCINUS, Stimpson.

*Typhlocarcinus*, Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 95.

Carapace as in *Ceratoplax*. Fronto-orbital border about half the greatest breadth of the carapace. Front less than a fourth the breadth of the carapace, more or less distinctly bilobed. Antero-lateral borders well curved, often emarginate in places: postero-lateral borders parallel.

Orbits in the usual position, completely filled by the immovable eye-stalks: eyes obsolete, or nearly so. The antennules fold nearly transversely, in proper pits. Basal antenna-joint short; the flagellum, which is short, stands in the orbital hiatus.

Epistome well formed and prominent: buccal cavern completely, or almost completely, closed by the external maxillipeds, the flagellum of which articulates with the antero-internal angle of the merus; the outer angle of the merus not produced.

Chelipeds subequal or unequal, much more massive than the legs from which they do not much differ in length: palm short deep and compressed, with sharp upper and lower borders.

Legs slender, unarmed, the 3rd pair slightly the longest: dactyli styliform.



The abdomen in both sexes consists of 7 separate segments and does not nearly occupy all the sternum between the last pair of legs.

*Distribution*: Indo-Pacific, from the Persian Gulf to Hongkong.

From *Rhizopa*, of which we possess specimens from Hongkong, this genus differs only in having the eyes obsolete and the external maxillipeds more closely opposed to each other. It may well be doubted whether these differences are of generic value.

*Key to the Indian species of Typhlocarcinus.*

- I. Antero-lateral borders with 2 or 3 emarginations:—
  1. Buccal cavern decreasing in size from behind forwards: antero-external angle of merus of external maxillipeds obsolete and rounded off ... .. *T. nudus*.
  2. Buccal cavern quite square: antero-external angle of merus of external maxillipeds sharp ... .. *T. villosus*.
- II. Antero-lateral borders of carapace entire: buccal cavern quite square ... .. *T. rubidus*.

24. *Typhlocarcinus nudus*, Stimpson.

*Typhlocarcinus nudus*, Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 96.

Carapace much transverse, its length only about five-eighths its greatest breadth, its surface smooth and bare, the regions hardly distinguishable. The posterior part of the antero-lateral border has two or three obscure notches.

The front, which is about a fifth the greatest breadth of the carapace, is grooved in the middle line—almost bilobed. Orbits broadly oval, almost subcircular.

Buccal cavern considerably decreasing in breadth from behind forwards: merus of the external maxillipeds with the antero-external angle obsolete and rounded off; the exognath very narrow.

Chelipeds and legs smooth, with only a few scant hairs on the margin. Chelipeds, in the male about twice the length of the carapace, a little longer than any of the legs: inner angle of wrist sharp, but not produced: palms unequal, smooth and polished, the upper border smooth and crest-like, the lower border with a distinct moulding.

In the Indian Museum are 25 specimens, from Karachi and the Mekran coast, Madras coast and Sandheads, and the Andamans.

In this species a tiny speck of pigment denotes an eye.

25. *Typhlocarcinus villosus*, Stimpson.

*Typhlocarcinus villosus*, Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 96  
Miers, P. Z. S., 1879, pp. 20, 40: Walker, Journ. Linn. Soc. Zool. XX. 1890, p. 110,  
pl. ix. figs. 6-8: Ortmann, Zool. Jahrb. Syst. VII. 1893-94, p. 689.

Carapace and appendages everywhere covered with velvet. Carapace

about three-fourths as long as broad, its greatest breadth across the middle: when denuded it is granular in places and the regions are hardly distinguishable. Three blunt granular teeth on the lateral borders, two of which are antero-lateral, the third being postero-lateral.

Front between a fourth and a fifth the breadth of the carapace, bilobed: orbits piriform.

Buccal cavern quite square: antero-external angle of merns of external maxillipeds well marked but not produced, the exognath normal.

Chelipeds about twice as long as the carapace, and nearly the same length as the 3rd (longest) pair of legs, their outer surface, especially that of the palm, is granular: inner angle of the wrist produced, dentiform. The legs are fringed with coarsish hairs.

In the Indian Museum, besides a specimen from Hongkong, are 6 from various parts of the coast of the Bay of Bengal.

The carapace of the best specimen is 6 millim. long and 8 millim. broad.

In this species also there is a tiny speck of pigment for an eye.

## 26. *Typhlocarcinus rubidus*, n. sp.

Carapace perfectly smooth and nude, except for a few hairs on the anterior and antero-lateral margins, its length a little over three-fifths its breadth, the regions hardly distinguishable, though the epibranchial regions have a decided dorsal bulge.

The antero-lateral borders, which, like the postero-lateral are blunt and granular, are quite entire.

Front about a fifth the breadth of the carapace, bilobed, the median groove very deep. Orbits piriform. Buccal cavern and external maxillipeds as in *T. villosus*.

Chelipeds and legs rather hairy, but there is always a large smooth bare space on the outer surface of the wrist and palm. Chelipeds about as long as the longest legs, less than twice the length of the carapace: inner angle of wrist produced, dentiform: below and above the bare patch on the wrist and hand the surface, when denuded, is granular.

The colour is a rich ruddy brown.

In the Indian Museum are 18 specimens from the Bay of Bengal, 20 to 65 fms.

The largest specimen has the carapace nearly 7 millim. long and 10 millim. broad, but there are egg-laden females smaller than this.

There is no pigment speck to represent an eye in this species.

## XENOPHTHALNODES, Richters.

*Xenophtalmodes*, Richters, in Möbins Meeresf. Maurit. p. 155, 1880.

Carapace rudely semicircular in outline, the posterior border being

the longest, and the postero-lateral borders being anteriorly-convergent to form a common curve with the well-arched anterior and antero-lateral borders: it is but little broader than long, is convex fore and aft and strongly declivous anteriorly, and shows the regions indistinctly and incompletely.

Fronto-orbital border less than half, front less than a fifth, the greatest breadth of the carapace, the front being prominent and bilobed.

Orbits in the usual position, completely filled by the immovable eye-stalks: eyes obsolete. The antennules are small, and fold obliquely rather than transversely in proper pits. Basal antenna-joint short: the flagellum, which also is short, stands in the orbital hiatus.

Epistome and mouth parts, as also the abdomen, as in *Typhlocarcinus*.

Chelipeds a little unequal, much more massive and rather longer than the legs, of which the 3rd pair is slightly the longest. Palm short deep and compressed, with sharp edges.

Legs slender, unarmed: dactyli styliform.

*Distribution*: Indian Ocean, from Mauritius and the Red Sea to the Andamans.

This genus differs from *Typhlocarcinus* in having the carapace more elongate and more semicircular in outline, the front more prominent and narrower, and the antennules more cramped in consequence.

## 27. *Xenophthalmodes moebii*, Richters.

*Xenophthalmodes moebii*, Richters, in Möbius, Meeresf. Maurit. p. 165, pl. xvi. fig. 29 and pl. xvii. figs. 1-5 1880: Miers, P. Z. S. 1834, pp. 10, 12: de Man, Notes Leyden Mus. XII. 1890, p. 68, pl. iii. fig. 5.

The carapace has rather a lop-sided look and is practically smooth, except for two rather deep semilunar impressions that incompletely separate the gastro-cardiac from the epibranchial regions: its surface is bare, but its free edges, like the edges of the chelipeds and legs, are thickly fringed with longish silky hairs: its length is about five-sixths the greatest breadth, which is quite posterior. Front very decidedly bilobed. Orbits oval. Buccal cavern very slightly decreasing in breadth anteriorly: the merus of the external maxillipeds has the antero-external angle rounded off.

Chelipeds in the male a little longer than the legs, and with the hands decidedly unequal: the inner angle of the wrist is acuminate: the upper edge of the palm is sharp and crest-like, the lower edge has a low granular crest or moulding, the surface of the palm is smooth and polished. The larger cheliped, measured along its convexities, is about twice the length of the carapace.

In the Indian Museum are 13 specimens, from the Persian Gulf, Malabar coast, Coromandel coast, Gulf of Martaban, and the Andamans. The carapace of the largest specimen is 10 millim. long and 12 millim. broad.

In one very young specimen the eye is represented by a tiny speck of pigment, as shown in de Man's figure, but in large specimens there is no trace of this speck.

#### SCALOPIDIA, Stimpson.

*Scalopidia*, Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 95 : Miers, Challenger *Brachynra* p. 223.

*Hypophthalmus*, Richters, Abh. Senck. Nat. Ges. Frankfurt, XII. 1881, p. 429.

Carapace of but moderate depth, moderately convex fore and aft and but moderately declivous anteriorly : it is a good deal broader than long and inclines somewhat to a semicircular outline, the greatest breadth being quite posterior, the postero-lateral borders being anteriorly convergent, and the antero-lateral borders being nicely curved : the regions are distinctly mapped out by fine grooves.

Fronto-orbital border about two-fifths, front about a fourth the greatest breadth of the carapace : front rather obscurely bilobed, antero-lateral borders acute.

Eyes minute, eyestalks fixed in small orbits which lie entirely beneath the anterior border of the carapace. The antennules fold transversely in shallow and rather inadequate pits. Basal antenna-joint short ; the flagellum, which is of moderate length, stands quite clear of the orbital hiatus.

Epistome sunken, not well demarcated from the edge of the buccal cavern : the latter is squarish and broader in front than behind. There is a considerable gap between the external maxillipeds, the merus of which is square and has a sharp antero-external angle and carries the flagellum at the antero-internal angle.

Chelipeds a little unequal, much shorter and not much more massive (except as regards the larger palm) than the third pair of legs : palm short and compressed, with sharp edges.

The legs have the merus broadened, especially in the case of the 2<sup>nd</sup> and 3<sup>rd</sup> pair : the 3<sup>rd</sup> pair is considerably the longest.

The abdomen consists of 7 separate segments, and does not nearly occupy all the sternum between the last pair of legs.

*Distribution* : Indo-Pacific, from Madagascar to China.

#### 28. *Scalopidia spinosipes*, Stimpson.

*Scalopidia spinosipes*, Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 95 : J. B. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 379.

Carapace and appendages downy. Carapace, length about two-

thirds the greatest breadth, its surface closely punctate: all the regions are quite plainly defined by grooves, which also subdivide the gastric into three subregions, and the epibranchial into two—an anterior and a posterior; and the cardiac region has a distinct bulge. The sharp-cut antero-lateral borders are, like the anterior border, very finely serrated, and are marked off from the blunt postero-lateral borders by a minute spine.

The larger cheliped is barely half again as long as the carapace: both chelipeds have the lower edge of the arm finely serrated, have a spinule near the far end of the upper border of the arm and one at the outer angle of the wrist, and have the inner angle of the wrist strongly dentiform.

The legs have their edges, except in the case of the dactyli, closely and evenly spinulate, but there is a tendency for the spines to fail on the posterior edge of the carpus and propodite. The 3rd pair, which are considerably the longest, are much more than  $2\frac{1}{2}$  times the length of the carapace. The legs increase remarkably in length from the 1st to the 3rd, and the 4th are about the same length as the first. The dactyli are sharp, strong, styliform and ciliated: those of the last pair are curved, those of the other pairs are straight.

Henderson records this species from the Gulf of Martaban: the only specimens in the Indian Museum are from Hongkong.

## 29. *TYPHLOCARCINODES*, n. gen.

Apparently one of the links between *Typhlocarcinus* and its allies on the one hand and *Scalopidia* on the other.

Carapace moderately deep, shaped much as in *Typhlocarcinus*, but slightly more elongate, the free edges hairy. Fronto-orbital border about three-fifths, front about a third, the greatest breadth of the carapace: front prominent, its free edge convex and entire.

Orbits in the normal position, narrow, button-hole shaped; eye-stalks tapering, immovable; eyes obsolete or nearly so. *Antennules cramped, folding very obliquely—nearly longitudinally—in proper pits.* Antennal peduncle small and cramped, the flagellum standing in the orbital hiatus.

*Epistome sunken, linear*: buccal cavern square, its anterior angles, like the antero-external angles of the merus of the external maxillipeds, rounded off: the external maxillipeds completely close the buccal cavern and have the flagellum articulated to the antero-internal angle of the merus.

The abdomen does not nearly occupy all the space between the last pair of legs.

The above diagnosis is framed on a broken specimen, without chelipeds or legs, in the Indian Museum. In the form of the front and shape of the carapace this specimen has a strong resemblance to the *Typhlocarcinus integrifrons* described and figured by Miers in Ann. Mag. Nat. Hist. (5) VIII. 1881, p. 260, pl. xiv. fig. 1. Miers himself was doubtful about referring his species to *Typhlocarcinus*.

Our specimen is too much damaged to furnish a useful specific diagnosis.

#### HEPHTHOPELTA, Alcock.

*Hepthopelta*, Alcock, Investigator Deep Sea Brachyura, p. 76.

Carapace very deep, inflated, rudely semicircular, about as long as broad, convex fore and aft and vertically deflexed anteriorly, all its borders entire and all, except the posterior, tumid, the cardiac and branchial regions well delimited.

Front considerably less than a third the greatest breadth of the carapace, bilobed, vertically deflexed; the whole extent of the fronto-orbital border is more than half the greatest breadth of the carapace.

Orbits small, shallow, excavated in the vertically-deflexed anterior border of the carapace, not concealing the eyes. Though the eyes are small and their stalks immovably fixed, they are well formed, well defined and well pigmented.

*The antennular fossæ are completely filled by the basal antennular joint, to the exclusion of the flagella.*

The basal antenna-joint is small, slender, and does not nearly reach the front; the flagellum, which arises in the orbital hiatus, is hardly longer than the orbit.

The epistome is of considerable width fore and aft and, though sunken, is well defined from the palate. The buccal cavern is square, though very slightly narrower in front than behind: the excurrent branchial canals are well defined. The external maxillipeds, which completely cover the buccal cavern, have the merus shorter and slightly narrower than the ischium and somewhat oval in shape, and the palp jointed to the antero-internal angle of the merus and of good size.

The legs are all long and slender and end in a slender dactylus: the third pair are slightly the longest.

The chelipeds are lost in the single specimen obtained, which is a female.

#### 30. *Hepthopelta lugubris*, Alcock.

*Hepthopelta lugubris*, Alcock, Investigator Deep Sea Brachyura, p. 77. pl. iv, fig. 2.

Carapace as long as broad, roughly semicircular or semiglobose, of thin texture, its surface very finely frosted and somewhat pubescent.

The fronto-orbital region is vertically deflexed and almost invisible in a dorsal view.

Epibranchial and cardiac regions tumid, circumscribed by deepish grooves.

Legs subcylindrical, with a finely frosted and pubescent surface: the third pair, which are slightly the longest, are about  $2\frac{3}{4}$  times the length of the carapace: the posterior (lower) border of the merus of the first two pairs is spinulose.

Colours in spirit, light yellow, eyes black.

A single female, without chelipeds, from the Andaman Sea, 490 fms. The carapace is 8 millim. long, and the same in breadth.

#### CAMATOPSIS, Alcock.

*Camatopsis*, Alcock, *Investigator Deep Sea Brachyura*, p. 75.

Carapace deep, rudely sub-semicircular, hardly broader than long, strongly convex fore and aft and declivous anteriorly: its antero-lateral borders short sharp and entire, its postero-lateral borders long sharpish and slightly convergent anteriorly: its only markings are two longitudinal grooves hardly visible on the undenuded carapace, that mark off the epibranchial regions.

Front considerably less than a fourth the greatest breadth of the carapace, obscurely bilobed; the whole fronto-orbital border is about half the greatest breadth of the carapace.

Orbits large, deep, and normally cut in the anterior border of the carapace: eyestalks large, tumid, conical, almost immovably fixed in the orbits: eyes reduced to a speck of pigment placed on the under surface of the tip of their stalks.

Antennular fossæ small, and filled entirely by the basal antennular joint, *to the complete exclusion of the large flagellum.*

The small basal antenna-joint is wedged in between and beneath the eyestalk and antennule, the second joint hardly reaches to the front, the flagellum is large and considerably longer than the orbit.

The epistome is of considerable width fore and aft, especially at its middle, and though sunken, is well separated from the palate. The buccal cavern is square, though rather broader in front than behind, and is almost entirely covered by the external maxillipeds. These have the merus as long as, and markedly broader than the ischium, owing to the strongly convex bulge of the outer border of the merus: the palp, which is of good size, is jointed to the antero-internal angle of the merus.

The chelipeds are moderately massive and in the male the hands are unequal. The arm is short and trigonal, the wrist rather long narrow and crooked.

Legs sufficiently long and stout, the penultimate pair being the longest; their dactyli are sharply trigonal and elegantly plumose: the last pair have the dactylus slightly curved and compressed.

The abdomen of the male, which is four-jointed, does not nearly fill the space between the last pair of legs.

Between the 4th and 5th segments of the sternum, in the male, is intercalated a long narrow plate that covers the external genital ducts.

### 31. *Camatopsis rubida*, Alcock and Anderson.

*Camatopsis rubida*, Alcock and Anderson, Ann. Mag. Nat. Hist. Jan. 1899, p. 13: Alcock, Investigator Deep Sea Brachyura, p. 76, pl. iv. fig. 3.

Carapace very finely granular when denuded of the short velvet that covers it and all parts of the body and appendages. The narrow front and the antero-lateral borders form a semicircular curve: the postero-lateral borders are anteriorly convergent, the greatest breadth of the carapace being between the bases of the penultimate pair of legs. The tumid anterior (true inner) borders of the eyestalks bulge beyond the orbital concavities of the anterior border of the carapace.

The efferent branchial canals cause an angular bulging or carination of the pterygostomian regions.

The chelipeds are unequal in the male (female unknown), the longer one being about  $1\frac{3}{4}$  times the length of the carapace. They are unarmed. In the larger hand the fingers meet only at tip and are finely toothed in the distal half only, being rather deeply notched in the basal half, while on the inner surface of the movable finger is a curious truncated spine. In the smaller hand the fingers meet throughout their extent and only the immovable finger is distinctly toothed, one or two of its teeth being enlarged.

The first and last pair of legs are about  $1\frac{2}{3}$  times, the second and third pair are about twice, the length of the carapace. In the last pair of legs the terminal joints are more strongly ciliated, and the dactylus is slightly curved and compressed as for swimming.

Colours in spirit rich chocolate brown. Animal entirely covered with velvet.

Three males from the Andaman Sea, 194 fathoms. The carapace of the largest is 9 millim. long and 10 millim. broad.

### Subfamily iv. HEXAPODINÆ, Miers.

#### LAMBDOPHALLUS, nov. gen.

Near *Hexapus*, De Haan, from which it chiefly differs in the form of the anterior pair of male sexual appendages, which are rigidly bent



into the form of an **L**, the horizontal limb of which is lodged in a special trench in the first segment of the sternum.

Carapace much broader than long, broadest behind. Front narrow, nearly vertically deflexed. Orbits small, circular, widely communicating with the antennular fossæ. The antennules fold transversely. Antennæ small, standing in the orbital hiatus.

Epistome well-defined. Buccal cavern with the sides slightly convergent anteriorly. The external maxillipeds have coarse palps, which, when folded, fill the rather broad space that exists between the ischiopodites: the merus is subquadrilateral, with the antero-external angle rounded off, and the palp articulates with its antero-internal angle: the exognath is not concealed.

Chelipeds unequal in the male, shorter but more massive than the legs.

*Only three pairs of legs, the fourth pair entirely absent.*

Sternum extremely broad. Abdomen of the male very narrow. The efferent ducts of the male sex open on the 4th sternal segment inside the fossa into which the abdomen fits.

### 32. *Lambdophallus sexipes*, n. sp.

Resembles *Hexopus sexpus*, De Haan, with a specimen of which I have compared it, but differs in numerous important characters.

Carapace subquadrilateral with the anterior angles broadly rounded off, much broader than long, convex fore and aft and anteriorly deflexed, nearly flat from side to side, the gastric and cardiac regions well defined, the surface uniformly finely granular under a lens.

Front nearly vertically deflexed, its edge square-cut but grooved or notched in the middle line, its breadth about a fifth the greatest breadth of the carapace.

Orbits freely communicating with the antennular fossæ: eyestalks immovable and very short, eyes small but well pigmented.

Antennules large, folding transversely; the inter-antennular septum narrow if complete.

Epistome lozenge-shaped, well defined: the sides of the buccal cavern converge slightly from behind forwards: the ischiopodites of the external maxillipeds are rather narrow and leave between them a widish gap, which, however, is filled by the flagella.

There is a deep crescentic groove across the pterygostomian region, just in front of the bases of the chelipeds, and there are several close-set oblique scorings near the antero-lateral angles of the buccal cavern.

Chelipeds in the male unequal, more massive than the legs, the larger one, not  $1\frac{1}{2}$  times the length of the carapace: under the lens their

outer surface is very finely and uniformly granular: the fingers are short, especially in the larger hand, and meet only at tip, and at the base of the dactylus of the larger hand is a molariform tooth.

**Legs tomentose:** only 3 pairs are present, the 4th pair not being represented even by a rudiment. The first pair, which are not much longer than the chelipeds, are the shortest and slenderest: the next two pairs, which are about equal in size, are not quite twice the length of the carapace.

**Sternum** very broad, finely and uniformly granular: in the male, in the first sternal segment, on either side of the last abdominal tergum, is a long narrow oblique trench, in which the ends of the modified abdominal appendages are lodged.

**Male abdomen** very narrow, not a fifth the breadth of the sternum at its base. The first tergum is short fore and aft, the second is linear and has a somewhat trilobed form, the 3rd 4th and 5th are fused to form a sort of hexagonal plate with the distal end narrowed, the 6th and 7th are separate.

The anterior of the two pairs of male abdominal appendages are most curiously modified: they are very long and stiff and are L shaped, and the proximal limb of the L lies beneath and parallel with the abdomen, while the distal limb of the L emerges at right angles to the abdominal tergum, and, instead of being free, lies in the special sternal canal before mentioned.

In the Indian Museum are 2 specimens, from the Bay of Bengal, 65 fathoms. The carapace is 4.5 millim. long and 7 millim. broad.

## Family II. PINNOTERIDÆ, Edw.

### *Key to the Indian genera of Pinnoteridæ.*

- I. Carapace ill-calcified: the ischium of the external maxillipeds is indistinguishably fused with the much enlarged merus:—
  1. Edges of the carapace swollen and ill-defined: dactylus of the external maxillipeds small and often abnormally placed, but present ..... PINNOTERES.
  2. The edge of the carapace, in all but its short fronto-orbital portion, forms a thin upturned crest: dactylus of the external maxillipeds wanting, or represented by a tiny pencil of hairs ..... XANTHASIA.
- II. Carapace well calcified: the ischium of the external maxillipeds is distinct and independent:—
  1. Ischium of the external maxillipeds much smaller than the merus: dactylus of the external maxillipeds very large, spathulate. Orbits and eyes normal, the orbits circular ..... TETTING.

2. Ischium of the external maxillipeds as well developed as the merus, the dactylus not enlarged. The orbits are narrow slits situated dorsally with their long axis almost at right angles with the anterior border of the carapace, and the eyes are minute or obsolescent ..... **XENOPHTHALMUS.**
3. Ischium of the external maxillipeds very much larger than the merus, the appendages as a whole being slender and not nearly closing the buccal cavern. The orbits are in the usual marginal position..... **CHASMOCARINOPS.**

### Subfamily XENOPHTHALMINÆ, nov.

#### XENOPHTHALMUS, White.

*Xenopthalmus*, White, Ann. Mag. Nat. Hist. XVIII. 1846, p. 177: Milne Edwards, Ann. Sci. Nat., Zool., (3) XX. 1853, p. 220: Burger, Zool. Jahrb., Syst. VIII. 1894-95, p. 386.

Carapace broader than long and broadest behind, arched antero-laterally, the regions faintly indicated. Front narrow, strongly deflexed.

The orbits are small, oblique or nearly longitudinal, button-hole like slits, placed dorsally almost at right angles to the frontal border, and the eyestalks are immovably embedded in them. The eyes are, at most, minute specks of pigment. The antennules and antennæ are extremely small, the antennules folding nearly vertically beneath the front.

Epistome not defined. Buccal cavern almost semicircular, completely closed by the external maxillipeds. The external maxillipeds have the ischium and merus equally well developed (the ischium being nearly square and the merus about a quadrant of a circle) and the palp articulated at the antero-external angle of the merus. Exognath small and concealed.

Chelipeds in the male "with the hands somewhat elongated and thickened," in the female short and very slender.

Legs fairly stout, the third pair the longest.

The abdomen in both sexes consists of seven separate segments.

#### Key to the Indian species of *Xenopthalmus*.

- I. The legs are ciliated and the third (longest) pair are not twice the length of the carapace ... .. *X. pinnoteroides*.
- II. The legs are ciliated towards the tip only, and the third (longest) pair are more than twice the length of the carapace ..... *X. obscurus*.

#### 33. *Xenopthalmus pinnoteroides*, White.

*Xenopthalmus pinnoteroides*, White, Ann. Mag. Nat. Hist. XVIII. 1846, p. 178, pl. ii. fig. 2f and Samarang Crust. p. 63, pl. xii. fig. 3: Milne Edwards, Ann. Sci.

Nat., Zool., (3) XX. 1853, p. 221 : Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 107 : Sluiter, Tijds. Nederl. Ind. XL. 1881, p. 162 : J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 394.

This species is included in the Indian Fauna on the authority of Professor J. R. Henderson. It seems to be characterized by having the ischium and merus of the external maxillipeds deeply grooved, longitudinally, near the outer margin; the legs stout and hairy, the third pair barely twice as long as the carapace; and the three terminal joints of the first pair of legs broadened so that their edges are almost carinate: the lateral borders of the carapace are granular or finely denticulate.

#### 34. *Xenophthalmus obscurus*, Henderson.

*Xenophthalmus obscurus*, J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 394, pl. xxxvi. figs. 18, 19.

Carapace glabrous and shiny, but its surface is somewhat creased: the median regions are separated from the branchial regions by grooves or depressions, and each branchial region is traversed obliquely in its posterior part by a low ridge.

The rounded-off antero-lateral corners of the carapace are traversed by three low fine ridges, nearly parallel with one another: one of these defines the pterygostomian region, the next appears to be the true antero-lateral border, while the most dorsal one runs from the angle of the orbit to the junction of the antero-lateral and postero-lateral borders.

Front narrow, nearly vertically deflexed, longitudinally grooved in the middle line, its free edge square-cut but faintly sinuous. The eyes are just visible as minute linear specks, placed posteriorly.

No epistome. The ischium and merus of the external maxillipeds are not deeply grooved near the outer border.

Chelipeds in the female shorter and much slenderer than the first and last pair of legs.

The 3rd pair of legs are the longest, being about  $2\frac{1}{4}$  times the length of the carapace: the second pair, though a little shorter than the 3rd, are equally stout. The first and last pairs are about equal to one another in size (in the female) being hardly longer than the carapace, and slenderer than the other legs. The terminal joints of all the legs are hairy: the posterior borders of the meropodites of the first three pairs are spiny, the anterior border being very finely serrulate.

In the Indian Museum are two females, one, with eggs, from off the Ganjam coast, 20 fathoms, the other from the Andamans. The carapace in the larger female is 6 millim. long and 8 millim. in greatest breadth.

## Subfamily ASTHENOGNATHINÆ, Stimps.

## CHASMOCARCINOPS, n. gen.

Carapace deep, convex fore and aft and declivous anteriorly: its greatest breadth is quite posterior, so that the postero-lateral borders, which are blunt, are anteriorly-convergent, though slightly so: the antero-lateral borders are sharp and form an elegant curve with the anterior border: the regions are nearly as well defined as they are in *Scolopidia*: its length is hardly less than its breadth.

The fronto-orbital border is considerably more than a third, but the front (which is bilobed) is only about a sixth, the greatest breadth of the carapace.

The orbits, which are in the usual marginal position, are small, and the *eyestalks*, which are immovable, are *shrunk within them*: the eyes are minute.

The antennular flagella are large and cannot be retracted into the antennular pits, which are filled entirely by the basal joint.

The antennal flagella are long—considerably more than a third the length of the carapace—and stand in the orbital hiatus.

Epistome sunken and not altogether well demarcated from the palate. The buccal cavern has its antero-external angles rounded off, and is not nearly closed by the external *maxillipeds*: these have the *merus* much shorter and narrower than the *ischium*, oval and somewhat oblique, and the *flagellum* appears to articulate with the summit of the *merus*.

The *chelipeds* are about as long as the legs and are very unequal in the male.

The third pair of legs are slightly the longest. As in *Scolopidia* the *dactylus* of the last pair of legs is recurved.

The abdomen in both sexes is narrow, not nearly occupying all the space between the last pair of legs, and in the male consists of 5 pieces, the 3rd–5th segments being fused. In the male also, as in *Camatopsis*, there is, on either side, a narrow plate intercalated between the 4th and 5th segments of the sternum and covering the external genital ducts.

This genus more clearly than any other connects the *Rhizopinæ* and the *Pinnotheridæ* together.

35. *Chasmocarcinops gelasimoides*, n. sp.

Carapace nearly as long as broad, its surface abundantly sprinkled with vesiculous granules, its free margins rather sparsely ciliated: all the regions are distinguishable, and the cardiac and posterior lobe of the gastric regions are defined by deep impressions: the antero-lateral

borders are sharply defined and granular. Front very distinctly bilobed, prominent.

Chelipeds in the male very unequal, the larger one being twice as long as the carapace, its chief bulk being contributed by the hand, which, with its large swollen polished palm and long crooked fingers meeting only at tip, recalls that of *Gelasimus*. The smaller cheliped (like the female chelipeds) is not much shorter than the larger one and, like it, has the articulation of the wrist confined to a rather prominent postero-inferior lobe of the hand, and the fingers longer than the palm: the chief difference is that the palm is not enlarged and swollen and that the fingers meet throughout almost all their extent. In both chelipeds the surfaces of all the segments are smooth, and there are sharpish granules along the borders of the arm and at the not very pronounced inner angle of the comparatively slender wrist.

The legs, like the fingers of the smaller cheliped, are fringed, but not very thickly, with hair. The 3rd pair are very slightly the longest, being twice the length of the carapace. The edges of the meropodites are furnished with sharp granules and spinules, these being abundant in the case of the first 3 pairs and rather few on the 4th pair. In the first 3 pairs also the carpopodites are of good length and subcylindrical, and the dactyli straight and almost styliform; but in the 4th pair the two terminal joints are compressed, the carpopodite being shortened and the dactylus recurved.

A male and a female from off Madras, 12 fathoms. The carapace of the male is 11 millim. long and 12 millim. broad.

#### Subfamily PINNOTHERELINÆ.

##### TETRIAS, Rathbun.

*Tetrias*, Rathbun, Proc. U. S. Nat. Mus. XXI. 1898, p. 607.

Carapace strongly calcified, broader than long, deep, subquadrangular, dorsally flattish, anteriorly declivous, the regions faintly indicated.

Front between a third and a fourth the greatest breadth of the carapace, its edge only deflexed, not directly united to the epistome. Orbits circular, small; eyestalks short, eyes small. The antennules fold a little obliquely from the transverse. Antennæ small, the flagellum in the orbital hiatus.

Epistome well defined: buccal cavern broadish, quadrilateral. External maxillipeds large, their palp about as large as their merus and ischium combined: ischium distinct, small; merus very large, carpus large and triangular and articulating at the antero-external

angle of the merus, propodite large and articulating with the end of the carpus, dactylus large and spatulate and articulating with the inner angle of the propodite: exognath small and a good deal concealed.

Chelipeds equal, short: the chelipeds in the male equal, and much stouter than the legs.

First 3 pairs of legs coarse, not differing much from each other or from the chelipeds in length, though the second pair are slightly the longest. The fourth (last) pair are very much smaller than the others.

The abdomen of the male is narrow and consists of 7 separate segments.

*Tetrias* differs very little from *Pinnixa* of which it might, perhaps, be regarded as a subgenus.

*Distribution*: Indo-Pacific, Andamans to California.

### 36. *Tetrias Fischeri*, (A. M. E.).

or *Pinnixa (Tetrias) Fischeri* (A. M. E.).

*Pinnotheres Fischeri*, A. Milne Edwards, Ann. Soc. Entomol. France, VII. 1867, p. 287.

*Pinnixa Fischeri*, A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 319, pl. xviii. fig. 3: de Man, Archiv fur Naturges. LIII. 1887, i. p. 385, pl. xvii. fig. 2.

Carapace and appendages everywhere covered by a close adherent coat of short hair. The regions of the carapace are fairly well indicated and its dorsal surface is closely and finely granular, except in the middle where also the hair is somewhat deficient. Deflexed edge of the front broadly triangular. Eyes well pigmented. The inner edge of the carpus and the inner and distal edges of the large spatulate dactylus of the external maxillipeds are fringed with a close row of hairs of extraordinary length.

Chelipeds in the male much more massive than the legs, and about  $1\frac{1}{2}$  times the length of the carapace: their movements are somewhat restricted. There are some spinules at the inner angle of the wrist, and numerous rows of granules—the lowermost row rather acute—on the outer surface of the palm: the fingers, which are shorter than the palm, are stumpy but sharp-pointed.

The first 3 pairs of legs are coarse and are all about  $1\frac{1}{2}$  times the length of the carapace, though the second pair are very slightly the longest. The 4th pair are very short—not two thirds the length of the carapace—and are much slenderer than the others. All the legs have a shaggy posterior border, and all end in small hooked dactyli. The posterior border of the meropodite of the last pair is armed with small coarse spines.

The abdomen of the male is narrow and consists of 7 segments: the first two segments are very short, the 3rd 4th and 5th gradually increase in length and slightly decrease in breadth, the 6th is a little shorter than the 5th, and the 7th is long and spatulate and encroaches on the buccal cavern.

In the Indian Museum is a single male specimen, from coral, from the Andamans: its carapace is a little over 5 millim. long and 7 millim. broad.

### Subfamily PINNOTERINÆ.

#### \*PINNOTERES, Latreille.

*Pinnoteres*, Latreille, Hist. Nat. Crust. et Ins. VI. p. 78, and Gen. Crust. et Ins., p. 34: Lamarck, Hist. Nat. An. Sans. Vert. (2nd edit. Vol. V. p. 410): Bosc, Hist. Nat. Crust. I. p. 239: Leach, Malac. Pod. Britt.: Desmarest, Consid. Gen. Crust. p. 116: De Haan, Faun. Japon. Crust., p. 34: Milne Edwards, Hist. Nat. Crust. II. 30, and Ann. Sci. Nat., Zool., (3) XX. 1853, p. 216: Dana, U. S. Expl. Exp. Crust. pt. I. p. 378: Bell, British Stalk-eyed Crust. p. 119: Miers, Challenger Brachyura, p. 275: Ortmann, Zool. Jahrb., Syst., VII. 1894, p. 698: Bürger, Zool. Jahrb. Syst., VIII. 1894-95, p. 362: Adensamer, Ann. Nat. Hofmus., Wien, 1897, p. 105.

Carapace often ill calcified, generally convex with ill-defined edges, in shape transversely oval, or circular, or subquadrangular or sub-hexagonal with rounded angles, the surface generally smooth, the regions seldom defined.

Front narrow, generally deflexed in the female if not in the male. Orbits small, circular, eyestalks short, eyes small. Antennules folding obliquely in small pits. Antennæ small, the minute flagellum standing in the inner angle of the orbit.

Epistome well defined. The buccal cavern is of a curious crescentic shape, being arched and very broad from side to side, but very narrow fore and aft. The external maxillipeds completely close the buccal cavern: they consist chiefly of the merus, which is fused with the ischium to form a single large obliquely-directed joint carrying the flagellum at its inner end: the flagellum is small though its propodite may be spatulate, and the dactylus is often inserted on the inner or flexor border of the propodite: the exognath is for the most part concealed.

The chelipeds and legs are short, the chelipeds being equal and generally, even in the female, stouter than the legs.

The abdomen in the male is narrow, in the female it is generally larger than the sternum: it consists of 7 separate segments.

\* *Pinnoteres*, the correct transliteration of the Greek word, was used by Rumph in 1705, so that no apology is necessary for reverting to it. ●



The Pinnoteræ live as parasites or messmates, generally within the mantles of Lamellibranch Mollusks.

*Key to the Indian species of Pinnoteræ.*

- I. The dactylus of the external maxillipeds is articulated far back on the inner or flexor edge of the propodite: the eyes in the female are not entirely visible in an ordinary dorsal view:—
  1. The dactyli of all the legs are about equal:—
    - i. Carapace somewhat octagonal in outline, with deepish tomentose pits separating the branchial from the median regions: first three pairs of legs nearly equal in length: dactyli of all the legs of fair length..... *P. Edwardsi*.
    - ii. Carapace circular, perfectly smooth: second pair of legs decidedly the longest: dactyli of all the legs very short..... *P. mactricola*.
  2. Dactylus of the 3rd pair of legs longer than any of the others ..... *P. purpureus*.
  3. Dactylus of the 4th pair of legs longer than any of the others ..... *P. parvulus*.
- II. The dactylus of the external maxillipeds is articulated to the tip of the propodite: the eyes in the female are entirely dorsal ..... *P. abyssicola*.

37. *Pinnoteræ Edwardsi*, de Man.

*Pinnotheres Edwardsi*, de Man, Journ. Linn. Soc., Zool., XXII. 1887-88, p. 103, pl. vi. figs. 6-9 (1889).

The description applies to the female.

The length of the carapace is nearly equal to the greatest breadth. Carapace octagonal in shape, with the angles rounded: its dorsal surface little convex, with tomentose depressions of some size and depth separating the median from the branchial regions. The deflexed part of the front is very distinctly triangular. Eyes very small, but deeply pigmented.

Dactylus of external maxillipeds slender and inconspicuous; placed far back on the inner edge of the spatulate propodite.

Chelipeds and legs more or less downy, especially on their under surface. Chelipeds nearly as long as the carapace, a little longer and much stouter than the legs, unarmed: dactylus as long as the upper border of the palm.

Legs rather coarse: the first 3 pairs are about equal in length, the 4th pair is a little shorter.

Carapace 15 millim. long and 16 millim. broad.

From an *Ostræa* from Mergui.

38. *Pinnotheres purpureus*, n. sp.

Closely related to *P. palaensis*, Bürger.

The description applies to the female.

Carapace and appendages smooth, polished, nude. Carapace transversely oval, strongly convex, the regions not well defined. Deflexed part of front broadly and indistinctly triangular. Eyes very small, but well pigmented.

Dactylus of external maxillipeds slender and inconspicuous, placed far back on the inner (flexor) edge of the propodite.

Chelipeds and legs slender, the chelipeds being little stouter than the legs and about the same length as the first pair of legs. The movable finger is not much more than half the length of the upper border of the palm.

*The third pair of legs are the largest of all*, their meropodites and carpopodites being longer than those of the first two pairs and nearly twice as long as those of the 4th pair. The dactyli of the 3rd and 4th pairs are several times the length of those of the first two pairs, and the dactylus of the 3rd pair exceeds that of the 4th pair. Though the 4th pair have a long dactylus their total length is not greater than that of either of the first two pairs.

Colour either hyaline with numerous minute specks of bluish-black pigment, or the specks may be sufficiently numerous to make the whole animal nearly black.

From an *Ostræa* from the Andaman Islands.

Carapace 7 millim. long and 9 millim. broad.

39. *Pinnotheres parvulus*, Stimpson, de Man.

*Pinnotheres parvulus*, Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 108: de Man, Journ. Linn. Soc., Zool., XXII. 1887-88, p. 105, and Archiv für Nat. LIII. 1887, i. p. 383: Ortmann, Zool. Jahrb., Syst., VII. 1893-94, p. 699: Bürger, Zool. Jahrb., Syst., VIII. 1894-95, pp. 363, 376, pl. ix. fig. 18 and x. fig. 17.

A single damaged female appears to differ from *P. purpureus* only in the following particulars:—

(1) though the 4th pair of legs are shorter than the 3rd, they are decidedly longer than the 2nd, and still more decidedly longer than the 1st.

(2) the dactylus of the 4th pair of legs is the longest of all.

40. *Pinnotheres mactricola*, n. sp.

Closely related to *P. cardii*, Bürger.

The description applies to the female.

Carapace perfectly circular smooth and polished, convex. Edge of front nearly straight. Eyes minute, well pigmented. •

Dactylus of external maxillipeds slender and inconspicuous, arising far back on the inner (flexor) edge of the propodite.

Chelipeds decidedly stouter than the legs and about as long as the first pair of legs: their inner border is scantily fringed with hair: their dactylus is nearly two-thirds the length of the palm.

Legs slender, fringed with hairs: the second pair are decidedly the longest—a little longer than the carapace: the fourth pair are decidedly the shortest: the first and third pairs are about equal in length: in all four pairs the dactyli are equally short.

From *Macra violacea*, from the mouth of the R. Hooghly.

Diameter of carapace not quite 6 millim.

In the male the front is a little prominent and the chelipeds are very much stouter.

#### 41. *Pinnotheres abyssicola*, Alcock and Anderson.

*Pinnotheres abyssicola*, Alcock and Anderson, Ann. Mag. Nat. Hist. (7) III. 1899, p. 14: Alcock, Investigator Deep Sea Brachynura, p. 81.

The description applies to the female.

Carapace subcircular, smooth, convex. Front rather prominent, little deflexed, broadly triangular. Eyes of good size but deficient in pigment, entirely dorsal.

The palp of the external maxillipeds is minute and is much concealed by hairs that fringe the prominent internal angle of the merus: the dactylus is borne at the tip of the propodite.

Chelipeds much stouter than the legs, nude except for a fringe of hairs on the lower border of the immobile finger: they are about as long as the carapace, and the dactylus is not much shorter than the upper border of the palm.

Legs slender, nude: the 2nd and 3rd pairs are slightly longer than the 1st and 4th, being nearly  $1\frac{1}{2}$  times the length of the carapace: the dactyli also of the 2nd and 3rd pairs are a little longer than those of the 1st and 4th.

From *Lima indica*, from 430 fathoms off the Travancore coast.

Diameter of carapace 8 millim.

#### XANTHASIA, White.

*Xanthasia*, White, Ann. Mag. Nat. Hist. XVIII. 1846, p. 176: Dana, U.S. Expl. Exp., Crust., pt. I. p. 383: Milne Edwards, Ann. Sci. Nat., Zool., (3) XVIII. 1853, p. 221: Bürger, Zool. Jahrb., Syst., VIII. 1894-95, p. 386.

Resembles *Pinnotheres* in structure and habit, but differs in the following particulars:—

The edge of the carapace is well defined and, in all but its fronto-

orbital portion, forms an upturned crest, so that the dorsal surface of the carapace is depressed and saucer-like. Other crests are found on the dorsal surface of the carapace and, in the centre, a large mushroom-like tubercle.

Though it is on an inferior plane, the narrow front is prominent and not deflexed.

The buccal cavern and mouth-parts have the same curious form, except that (owing to the encroachment of the epistome in the middle line) the anterior edge of the buccal cavern is bilobed or bow-shaped rather than semicircular, and the dactylus of the external maxillipeds is wanting or is represented by a few hairs.

*Distribution* : Indo-Pacific, from the east coast of Africa to Fiji.

#### 42. *Xanthasia murigera*, White.

*Xanthasia murigera*, White, Ann. Mag. Nat. Hist. XVIII. 1846, p. 177, pl. ii. fig. 3: Dana, U. S. Expl. Exp., Crust. pt. I. p. 384, pl. xxiv. figs. 6 a-b: Milne Edwards, Ann. Sc. Nat., Zool., (3) XX. 1853, p. 221: A Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 321: Haswell, Cat. Austral. Crust. p. 113: Miers, Zool. H. M. S. Alert, pp. 518, 546: de Man, Journ. Linn. Soc., Zool., XXII. 1887-88, p. 106: Bürger, Zool. Jahrb., Syst. VIII. 1894-95, p. 386, pl. x. fig. 33: Adensamer, Ann. K.K. Nat. Hofmus. Wien, XII. 1897, p. 109: Nobili, Ann. Mus. Genov. (2) XX. 1899, p. 264.

The edge of the carapace is formed, in all but its short fronto-orbital portion, by a thin sharp upturned overhanging crest, which ends in a curl on the anterior part of either branchial region.

A large mushroom tubercle, having a rough or reticulate surface and a more or less reniform outline, occupies the middle of the dorsal surface of the carapace, and between this and the front is a pair of parallel longitudinal crests.

The front is somewhat prominent and is dorsally grooved or obscurely bilobed, and on each side of it, beyond the small orbits, is a small wing-like projection.

Chelipeds not, or hardly, stouter than the legs: the dactylus in the male is about two-thirds, in the female not much more than half the length of the palm.

Legs rather coarse: the first three pairs, which are about equal to one another and to the chelipeds in length, are about as long as the carapace, the fourth pair are a little shorter: the dactyli in all are about equally short.

In the female the broad abdomen is traversed longitudinally by a sort of coarse interrupted carina.

In the Indian Museum are 5 specimens from the Andamans and Mergui. The carapace of the largest female is 11.5 millim. long and 15.5 millim. broad.

The *Xanthasia* sp., or *Xanthasia Whitei*, from Mergui, referred to by de Man in Journ. Linn. Soc., Zool., XXII. 1887-88, p. 106, pl. vii. fig. 1 is represented in the collection by a single small male and is characterized by having the upraised edge of the carapace blunt and rounded, instead of thin and acute, and the median tubercle of the carapace ill defined instead of sharply circumscribed: the posterior margin of the carapace, also, is more prominent and is not quite continuous with the lateral margins. The legs also are somewhat longer.

### Family OCYPODIDÆ, Ortmann, emend.

#### *Key to the Indian genera of Ocypodidæ.*

- I. A hairy-edged pouch leading into the branchial cavity, between the bases of the 2nd and 3rd pair of true legs [*Ocypodinæ*]:—
  1. Antennular flagella rudimentary, completely hidden beneath the front: antennæ small, almost rudimentary: eyes very large, occupying the greater part of the ventral surface of the eyestalks: chelipeds very unequal in both sexes ..... OCYPODA.
  2. Antennular flagella small, not hidden beneath the front: antennæ of good size: eyes small, terminal on the long slender eyestalks: in the male only, one cheliped is enormously enlarged the other being very small ..... GELASINUS.
- II. No pouch or opening between the bases of any of the legs:—
  1. The antennules fold obliquely or nearly vertically: curious membranous spaces, or "tympana," are present on the meropodites of the legs (*Scopimerinæ*):—
    - i. Tympana very well defined: external maxillipeds very large and with a strong almost hemispherical bulge forwards:—
      - a. Merus of external maxillipeds larger than the ischium: the distal end of the 4th abdominal segment of the male is fringed with bristles and overlaps the 5th segment ..... DOTILLA.
      - b. Ischium of external maxillipeds larger than the merus: the 4th abdominal segment of the male is normal, but the 5th is constricted in part or all of its extent and gives the abdomen a wasp-like appearance ..... SCOPIMERA.

AND ..... SCOPIMERA.

- ii. Tympana ill defined: external maxillipeds of moderate size, the merus larger than the ischium: the chelipeds of the female, though not so stout as those of the male, are stouter than the legs ..... **TYMPANOMERUS.**
- 2. The antennules fold obliquely or quite transversely: no "tympana" are present on any of the joints of the legs (*Macrophthalminae*):—
  - i. Merus of the external maxillipeds smaller than the ischium, the flagellum coarse and articulating at the antero-external angle of the merus: front deflexed: eyestalks often very long ..... **MACROPHTHALMUS.**
  - ii. Merus of the external maxillipeds as large as or larger than the ischium, at least the two terminal joints of the flagellum are slender: eyestalks not particularly long:—
    - a. Front declivous: carapace slightly convex: the flagellum of the external maxillipeds articulates at the antero-external angle of the merus: (the chelipeds of the female, as in all *Macrophthalminae*, are shorter and slenderer than the legs) ..... **CLISTOSTOMA.**
    - b. Front square-cut, not in the least deflexed; carapace quite flat dorsally: the flagellum of the external maxillipeds articulates near, but not at, the antero-external angle of the merus: eyes not terminal on the eyestalks ..... **TYLODIPLAX.**

#### Subfamily OCYPODINÆ, Dana.

##### OCYPODA, Fabr.

*Ocypoda*, Fabricius, Ent. Syst. Suppl. p. 347: Desmarest, Consid. Gen. Crust. p. 119, and Dict. Sci. Nat. XXVIII. p. 239: De Haan, Faun. Japon. Crust. p. 29: Milne Edwards, Hist. Nat. Crust. II. 41, and Ann. Sci. Nat., Zool., (3) XVIII. 1852 p. 141: Dana, U. S. Expl. Exp. Crust. pt. I, p. 324: Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, p. 179: Miers, Ann. Mag. Nat. Hist. (5) X. 1883, p. 376, and Challenger Brachyura, p. 237: Ortmann, Zool. Jahrb., Syst., X. 1897-98, p. 359 (*Revision der Gattung Ocypoda*).

Carapace deep, square or subquadrilateral, broader (but not much broader) than long, moderately convex, strongly declivous anteriorly, its dorsal surface closely granular with the regions indistinctly and incompletely defined. Front a narrow deflexed lobe, from a seventh to an eighth the greatest breadth of the carapace.

Orbits very capacious, occupying the whole face of the carapace between the front and the antero-lateral angles on either side, usually not very deep: their floor is divided into two fossæ, one for the basal portions of the eyestalk, the other for the eye. The basal joint of the eyestalk is visible throughout: the eye chiefly occupies the ventral surface of the eyestalk, and is often, but not always, tipped by a horn or style formed by a prolongation of the latter.

The basal antennular joint is visible, but the rudimentary antennular flagellum is quite hidden beneath the front. The antennæ, which lie in the orbital hiatus, are, though properly formed in all their parts, little more than rudiments.

The epistome, though short, is quite distinct, and is sculptured. The buccal cavern (in its widest part) is as broad as long, but diminishes in size a little, anteriorly: it is completely closed by the external maxillipeds, which are somewhat narrow and elongate and end in a coarse flagellum that articulates with the antero-external angle of the merus.

Chelipeds shorter than the legs and, in both sexes, remarkably unequal, the larger one being much more massive than the legs. The palm is short and high—especially in the larger cheliped—and is almost always compressed—especially so in the smaller cheliped: the fingers are stout, usually compressed, and strongly toothed. In most cases there is, on the inner surface of the larger palm, near the fingers, a stridulating organ, which can be scraped against the inner surface of the ischium.

Legs stout, the fourth pair much shorter and somewhat less massive than the first three pair, which are of about equal length: between the basal joints of the 2nd and 3rd pair is an orifice, thickly protected by hairs, leading towards the branchial cavity. The branchial cavity is very capacious, and its lining membrane is thick spongy and vascular.

The abdomen of the male is narrow: in both sexes it consists of seven separate segments.

*Distribution:* Tropical and subtropical coasts, from the American Atlantic, through the Mediterranean and Red Seas, to the American Pacific.

The Ocypodes live together in large companies, and most of them are in the habit of digging long and tortuous burrows in the moist sand near high-water mark, into which they retire with great rapidity when alarmed. As a rule they do not go far from their burrows, but if they do happen to wander and are cut off, they run to sea with marvellous speed. Though the burrows can be but temporary structures, each individual crab, in all the species that I have observed, keeps rigidly to its own. The efficacy of the stridulating-organ as a musical instrument is beyond

dispute, and I have published my own observations on that of *O. macrocera* in the Administration Report of the Marine Survey of India for the year 1891-92 (reprinted in the *Annals and Magazine of Natural History* for 1892). Dr. A. R. Anderson has published a note on the sound produced by *O. ceratophthalma* in this *Journal* for the year 1894.

My own opinion is that these crabs use the stridulating-organ when in their burrows—which undoubtedly are private property—to warn intending intruders of the herd that the burrow is occupied, and thus to prevent the burrow becoming crowded to suffocation-point. This, of course, need not be its exclusive use.

### *Key to the Indian species of Ocypoda.*

- I. No stridulating ridge on the inner surface of the palm: eyestalks not prolonged beyond the eyes in the form of a style ..... *O. cordimana.*
- II. A stridulating ridge on the inner surface of the palm: eyestalks (except sometimes in the young) prolonged beyond the eyes to form a horn or style:—
  1. Length of the stridulating organ much more than half the greatest breadth of the palm: antero-lateral angles of the carapace well pronounced:—
    - i. Fingers of both chelipeds pointed:—
      - a. Stridulating ridge narrow, consisting entirely of small tubercles: no brushes of hairs on the propodites of any of the legs ..... *O. platytarsis.*
      - b. The stridulating ridge consists of tubercles gradually passing into striæ: the anterior surface of the propodites of the first two pairs of legs thickly furnished with hairs ... *O. ceratophthalma.*
    - ii. Fingers of the smaller cheliped expanded at tip: the stridulating ridge consists entirely of striæ... *O. macrocera.*
  2. Length of the stridulating organ much less than half the greatest breadth of the palm: antero-lateral angles of the carapace rounded off ..... *O. rotundata.*

The synonymy of the species of *Ocypoda* has been discussed, at length, by Ortmann (*Zool. Jahrb., Syst.*, X. 1897-98, p. 359), who has had access to a great deal more material than I have. It would be inadvisable, therefore, for me, working on a collection made almost entirely in India, to attempt any independent criticism of the older work; so that, in dealing with the Indian species, I shall generally restrict my citations to the papers of Ortmann and the other authors (Kingsley and Miers) who have made a revision of the genus.

### 43. *Ocypoda ceratophthalma* (Pallas), Ortm.

*Cancer ceratophthalmus*, Pallas, *Spicilegium Zool.* IX. p. 83, pl. v. figs. 7, 8.

*Cancer cursor*, Herbst, *Krabben*, I. ii. 74, pl. i. figs. 8, 9.

*Ocypoda ceratophthalma*, Fabricius, *Ent. Syst. Suppl.* p. 347: Milne Edwards, *Hist. Nat. Crust.* 11. 48, and Cuvier *Règne An. Crust.* pl. 17: Kingsley, *Proc. Ac.*



Nat. Sci. Philad. 1880, p. 179: Miers, Ann. Mag. Nat. Hist. (5) X. 1882, pp. 378, 379: C. W. S. Aurivillius, Zur. Biol. Amphib. Decap., p. 17 (Mitg. K. Ges. Wiss. Upsala, 1893).

ORTMANN, ZOOL. JAHRB., SYST. X. 1897-98, pp. 360, 364 (*ubi synon.*).

Carapace square, its greatest breadth, which is about a tenth more than its greatest length, is at the acuminate antero-lateral angles, which coincide with the outer orbital angles and are right angles, or nearly so.

The borders of the carapace, with the exception of the posterior border, are elegantly beaded or serrulate, and the lateral borders in their anterior third are straight and parallel, or nearly so.

The cardiac region can be distinguished, and the anterior ends of the cervical groove are present on either side of the gastric region.

Upper border of orbit sinuous and a little oblique, so that the outer angle of the orbit is considerably behind the front: the lower border has an obscure notch near its middle, but there is *no gap at its outer angle*. The eyestalk is prolonged beyond the eye into a blunt-pointed style of variable length.

The lateral borders of the buccal cavern, though their general direction is slightly convergent anteriorly, have a distinct outward curve. The merus and ischium of the external maxillipeds have their exposed surface circumscribed by a raised row of granules, which is deficient only at the basal attachment of the ischium.

Chelipeds and legs scabrous, the asperities having in many places a tendency to a rugiform or squamiform arrangement, and almost forming serrations on the borders of some of the joints, and becoming spines or teeth on the lower borders of the arms and hands and at both angles of the wrist—especially at the inner angle where there is always at least one distinct spine.

The stridulating organ of the larger palm is of good length (much more than half the greatest breadth of the palm) and is some little distance from the immobile finger, a thick strip of hair intervening: in its upper half it consists of tubercles gradually passing to striæ, in its lower half it consists of a comb of fine regular and very close-set striæ. It plays against a polished ridge that runs across the upper part of the inner surface of the ischium.

The palms and fingers of both hands—but notably of the smaller hand—are compressed, and the fingers of both hands are *pointed*.

The first three pairs of legs have the merus broadened: they do not differ greatly in length, and the 2nd pair, which are slightly the longest, are about two-and-a-half times the greatest length of the carapace. The fourth (last) pair are a good deal shortened—reaching only a little

more than half-way along the propodite of the 3rd pair—and have a much narrower merus. In all the legs the dactylus is stout and fluted like a bayonet and has more or less of its anterior surface hairy: though somewhat laterally-compressed at base and gradually broadening and becoming dorso-ventrally compressed towards the tip, it may fairly be called styliform. The propodites of the first two pairs of legs have conspicuous brushes of hairs along their anterior surface.

In the Indian Museum are 84 specimens from all parts of the coasts of the mainland and islands of India. Large specimens have the carapace 40 millim. long and about 45 millim. in greatest breadth.

*Distribution*: Indo-Pacific, from the east coast of Africa to the Sandwich Islands.

In young specimens the surface of the appendages is smoother and the eyestalks are not prolonged beyond the eyes, which are of large size. In half-grown specimens the terminal style of the eyes is still short.

#### 44. *Ocypoda macrocera*, Edw.

*Ocypoda macrocera*, Milne Edwards, Hist. Nat. Crust. II. 49: Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, p. 181: Miers, Ann. Mag. Nat. Hist. (5) X. 1882, pp. 378, 381: ORTMANN, ZOOL. JAHRB., SYST., X. 1897-98, pp. 360, 368.

Closely related to *O. ceratophthalma*, from which it is distinguished by the following characters:—

(1) the carapace is rather broader and the orbits are a little more oblique:

(2) the raised marginal row of granules on the external maxillipeds is less pronounced:

(3) the fingers of the smaller cheliped are lamellar up to the tips, which are broad and blunt, not pointed:

(4) the stridulating ridge is less hairy and consists entirely of striæ.

(5) it is a smaller species, large specimens having the carapace 31 millim. long and 37 millim. broad.

In the Indian Museum are 78 specimens from the coasts of the Bay of Bengal: there are none from the west coast or from any of the islands, and the species appears to be confined to the Bay.

The colour, in life, is bright red. This species lives in large warrens in the sands of almost all parts of the east coast of the peninsula. One of its most active enemies is the Brahminy kite (*Haliastur indus*). One almost certain use of the stridulating-organ is to give warning to intending trespassers, of its own species, that a burrow is already occupied by its rightful owner.

45. *Ocypoda platytarsis*, Edw.

*Ocypoda platytarsis*, Milne Edwards, Ann. Sci. Nat. Zool. (3) XVIII. 1852, p. 141: Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, p. 180: Miers, Ann. Mag. Nat. Hist. (5) X. 1882, pp. 378, 383: ORTMANN, Zool. Jahrb., Syst., X. 1897-98, pp. 359, 363 (*ubi synonym.*).

This species may be distinguished from *O. ceratophthalma*, which it closely resembles, by the following characters:—

(1) the carapace is very distinctly broader, its length being about four-fifths of its breadth, and the orbits are hardly at all oblique:

(2) the surface of the ischium of the external maxillipeds is often quite smooth:

(3) the stridulating ridge is not, or hardly at all, hairy and consists entirely of granules or small mamillated tubercles; and though the upper edge of the inner surface of the ischium of the larger cheliped is raised and rough, there is no special process against which the stridulating-ridge of the palm can be scraped:

(4) the dactyli of the legs, though fluted as in the other species, are distinctly compressed dorso-ventrally and broadened:

(5) there are no brushes of hairs along the anterior surface of the propodites of any of the legs.

It is a somewhat larger species, the carapace in full-sized adults being 40 millim. long and 54 millim. broad.

In the Indian Museum there are 42 specimens from both coasts of the peninsula and from Ceylon.

46. *Ocypoda rotundata*, Miers.

*Ocypoda rotundata*, Miers, Ann. Mag. Nat. Hist. (5) X. 1882, pp. 378, 382: Ortmann, Zool. Jahrb., Syst., X. 1897-98, pp. 360, 364.

This species differs from *O. ceratophthalma* in the following important particulars:—

The carapace is less distinctly quadrilateral, owing to the fact that the antero-lateral borders are arched, instead of forming an angle with the upper border of the orbit. These borders sometimes form an unbroken curve with the upper border of the orbit, but sometimes the junction between the two is marked by a notch. The length of the carapace is about five-sixths its greatest breadth, which, owing to the curvature of the antero-lateral borders, is some distance behind the orbits.

There is a notch in the middle of the lower border of the orbit, and a gap at the outer angle, between the upper and lower borders.

The deflexed tip of the front is swollen.

The spines or serrations at the inner angle of the wrist are more numerous, and at the outer angle are better marked.

The length of the stridulating organ is much less than half the greatest height of the palm: the organ consists of about a dozen distant ridges much concealed in hair, and each ridge is sharply serrated.

The scraper on the ischium is placed near the upper angle of the inner face of that joint and consists of an elongate-elliptical longitudinally-grooved cinctrix-like surface, with a patch of hair above it and a much larger patch below it.

The fingers of the smaller chelipeds are almost as much dilated at tip as those of *O. macrocera*.

The dactyli of the legs are dorso-ventrally compressed as in *O. platytarsis*.

There is a thick brush of hairs along the anterior surface of the propodite of the first pair of legs only.

The meropodites of the first three pairs of legs are not so broad as in the three preceding species.

In the Indian Museum are 29 specimens from the coasts of Cutch, Sind, and Baluchistan.

This is the largest Indian Ocypode, the carapace of the adult being 52 millim. long and 62 millim. broad.

#### 47. *Ocypoda cordimana*, Desm.

*Ocypoda cordimana*, Desmarest, Consid. Gen. Crust. p. 121: Milne Edwards, Hist. Nat. Crust. II. 45: Kingsley, Proc. Ac. Nat. Sci. Philad., 1880, p. 185: de Man, Notes Leyden Mus., III. 1881, p. 248: Miers, Ann. Mag. Nat. Hist. (5) X. 1882, pp. 379, 387: ORTMANN, ZOOL. JAHRE, Syst., X. 1897-98, pp. 359, 362 (*ubi synonym.*).

Carapace deep, quadrilateral, strongly convex fore and aft, its length about seven-eighths its greatest breadth, which is some little distance behind the orbits, owing to the gentle curve of the antero-lateral borders: its antero-lateral angles coincide with the outer orbital angles, and point acutely forwards.

Orbits deep; their upper border sinuous, but not in the least oblique; there is usually a notch near the middle of their lower border, and always a deep gap at the outer angle. No terminal style to the eyes.

The lateral borders of the buccal cavern are anteriorly convergent and have no outward curve. The marginal row of granules on the outer surface of the ischium of the external maxillipeds is indistinct or absent.

Though the chelipeds and legs are rough and the roughness is in places squamiform, there is no serration of their edges, except in the case of the lower borders of the arms, the inner edge of the wrists, and the lower border of the hands. The palm of the larger hand, though deep, is not particularly compressed, and it has no stridulating ridge.

The propodites and dactyli of the legs are rather short and stout, the dactyli being fluted and more or less hairy: the edges of the propodites of the first 2 pairs of legs are hairy. The third pair of legs, which are slightly longer than the first 2 pairs, are less than twice the length of the carapace.

In the Indian Museum are 59 specimens, from the Laccadives, the Madras coast, Ceylon, Mergui, Tavoy, the Andamans and Nicobars.

The carapace of the largest specimen is 35 millim. long and 40 millim. broad.

#### GELASIMUS, Latr.

*Gelasimus*, Latreille, Dict. des Sciences Nat. XVIII. p. 286 (1820): Desmarest, Consid. Gen. Crust. p. 122, and Dict. Sci. Nat. XXVIII. p. 241: De Haan, Fann. Japon Crust. p. 25: Milne Edwards, Hist. Nat. Crust. II. 49, and Ann. Sci. Nat., Zool., (3) XVIII. 1852, p. 144: Dana, U. S. Expl. Exp. Crust. pt. I, pp. 312, 315: Hess, Archiv f. Naturges. XXXI. 1863, p. 145: A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 271: Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, pp. 135, 136: Miers, Challenger Brachyura, p. 241: de Man, Notes Leyden Mus. XIII. 1891, pp. 20-23: Ortmann, Zool. Jahrb., Syst. VII. 1893-94, pp. 749-753.

"*Uca*," Leach, Trans. Linn. Soc. XI. 1815, pp. 369, 323: M. J. Rathbun, Proc. Biol. Soc. Washington, XI. 1897, p. 154: Ortmann, Zool. Jahrb., Syst., 1897-98, p. 346 (cf. notes by Desmarest and Milne Edwards, *ll. cc. supra*).

In obedience to certain interpretations of the rule of priority, which sacrifice everything to a legal precision that defeats the object of classification, some modern authors propose to apply the name *Uca*, which was originally given to and has for nearly seventy-five years been authoritatively used for a land-crab of the Gecarcinoid family, to the species of the Ocypodoid family which have for the same long period been known to everybody by the name *Gelasimus*.

One of the objects of my poor work being to avoid confusion, I cannot consent to this proposal: and if the rules of nomenclature do not permit me to retain a name that has been deliberately chosen, and used without any ambiguity, by such illustrious predecessors as Latreille, Milne Edwards, and Dana, then I think that the rules should be modified.

The introduction of a rule sanctioning the retention of any name that has been accepted and defined by a monographer of repute, and that has thereafter been in common use for fifty years, would probably satisfy those to whom the written authority of the law is a consideration of first importance.

Carapace deep, subquadrilateral but with the antero-lateral angles produced and acute and the lateral borders more or less convergent posteriorly, occasionally subhexagonal, a good deal broader than long, the regions never very strongly defined. The front is a narrow declivous lobe, the breadth of which, between the eyestalks, is from one-sixteenth to one-sixth the greatest breadth of the carapace.

The orbits are narrowish trenches occupying the whole anterior extent of the carapace between the narrow front and the antero-lateral

angles, and are more or less sinuous and oblique: the eyestalks are very long and are formed as in *Ocypoda*, but are much slenderer: the eyes, though chiefly ventral in aspect, are always terminal.

The small antennular flagella, which are not hidden under the front, fold obliquely. The antennae, which stand free at the inner angle of the orbits, have well developed flagella.

Epistome, though short, quite distinct. The lateral borders of the buccal cavern are convex outwards, sometimes so much so as to give the cavern a subcircular outline. The external maxillipeds have a long ischium and a short and somewhat oblique merns with the coarse flagellum jointed to its antero-external angle: they close the buccal cavern except for a chink anteriorly.

The chelipeds differ greatly in the sexes. In the female they are equal, are shorter and slenderer than the legs, and have broad-tipped spoon-shaped fingers. In the male one of the chelipeds resembles those of the female, but the other is of relatively gigantic proportions, the hand alone being often as big and heavy as all the rest of the animal.

The legs are stout and end in very sharp dactyli, and the meropodites of at least the 2nd and 3rd pairs are foliaceous: these two pairs are a little longer than the other two, being about twice the length of the carapace.

As in *Ocypoda*, the branchial cavity is capacious, and its lining membrane thickened and vascular, with a fleshy lobe, shaped like a gill-plume, projecting into the space between the tips of the last two gill-plumes: also, between the basal joints of the 2nd and 3rd pairs of legs, there is an orifice, thickly protected by hairs, leading towards the branchial cavity.

The abdomen of the male is narrow: in both sexes of all the Indian species it consists of seven separate segments.

*Distribution*: all the warmer regions of the globe, from the Atlantic coasts of America eastwards (including the Mediterranean basin) to the Pacific coasts of America again.

The species of *Gelasimus* are, like the *Ocypodes*, gregarious, and live in warrens in the mud-flats of tropical and subtropical estuaries. Their intelligence, like that of the *Ocypodes*, is of a high order.

In one species, at any rate (*Gelasimus annulipes*), the males, which are greatly in excess of the females, use the big and beautifully-coloured cheliped, not only for fighting with each other, but also for "calling" the females. I have described my own observations on these points in the *Administration Report of the Marine Survey of India for 1891-92*—reprinted, as an extract, in the *Annals and Magazines of Natural History* for 1892.

The fact that the males greatly outnumber, and therefore are more

commonly captured than, the females, is sufficient justification for the common practice of using the larger cheliped of the male for the discrimination of the species. It must, however, be remembered that—at least in all the Indian species—this organ changes greatly with advancing age.

I must also confess here that the synonymy of species has defied me.

*Key to the Indian species of Gelasimus.*

- I. The breadth of the front, measured exactly between the bases of the eyestalks, is between a fifth and a sixth the greatest breadth of the carapace:—
  1. Two oblique granular ridges on the inner surface of the palm of the large cheliped of the male, one continuous with the dentary edge of the immobile finger, the other running to the lower edge of the same finger:—
    - i. Carapace subquadrilateral, the true lateral borders being moderately convergent posteriorly: an enlarged tooth near the tip of the immobile finger of the large cheliped of the male gives the tip of this finger a notched-truncate appearance *G. annulipes.*
    - ii. Carapace subquadrilateral, the true lateral borders nearly parallel: the tip of the immobile finger of the large cheliped of the male is oblique-truncate but not notched ..... *G. lacteus.*
    - iii. Carapace distinctly hexagonal, owing to the great obliquity of the orbits and the strong convergence posteriorly of the true lateral borders: tip of the immobile finger of the large cheliped of the male not truncate or notched ..... *G. triangularis.*
  2. The oblique crest running to the lower edge of the immobile finger of the large cheliped of the male is either absent or is represented by a slight and smooth tumescence ..... *G. inversus.*
- II. The breadth of the front, measured as above, is very much less than a sixth the greatest breadth of the carapace:—
  1. No row of granules running inside of and parallel with the lower border of the orbit:—
    - i. The inner border of the arm of the larger cheliped of the male ends in a sharp tooth or spine, independent of the terminal lobe-like constriction of the arm:—
      - a. Front, measured as above, about a tenth the greatest breadth of the carapace: in the large cheliped of the male the wrist is

- smooth, the palm full with the granular ridges on the inner surface indistinct, and the fingers are not specially compressed... *G. tetragonum*.
- b. Front, measured as above, not a fifteenth the greatest breadth of the carapace: in the large male cheliped the upper surface of the wrist is granular and the fingers are remarkably compressed and blade-like:—
- a. In the large male cheliped the crests on the inner surface of the palm are moderately prominent, the dactylus is quite blade-like and the cutting-edge of the immobile finger is not much scalloped ..... *G. Marionis*.
- β. The crests on the inner surface of the palm are extremely prominent, the cutting edge of the dactylus is not quite straight and that of the immobile finger is scalloped into two large triangular lobes ..... *G. Marionis*, var. *nitidus*.
- ii. The arm of the large male cheliped ends in a constricted lobe, but there is no sharp upstanding tooth inside it on the inner border:—
- a. Front, measured as above, about a twelfth the greatest breadth of the carapace; the fingers of the large male cheliped have tips that suggest tongs, owing to the presence of an enlarged tooth near the tip: the meropodites of the last pair of legs are nearly as foliaceous as those of the preceding pair ..... *G. acutus*.
- b. Front, measured as above, not a fifteenth the greatest breadth of the carapace: the fingers of the large male cheliped end in simple hooked tips: the meropodites of the last pair of legs are not much broadened ..... *G. Dussumieri*.
2. On the lower wall of the orbit, inside of and parallel with the middle third of the lower border of that cavity, is a raised row of granules ..... *G. Urvillei*.

#### 48. *Gelasimus annulipes*, Latr., Edw.

? *Cancer vocans minor*, Herbst, Krabben, I. ii. 81, pl. i. fig. 10.

*Gelasimus annulipes*, Milne Edwards, Hist. Nat. Crust. II. 55, pl. xviii. fig. 10-18; and Ann. Sci. Nat., Zool. (3) XVIII. 1852, p. 149, pl. iv. fig. 15: Dana, U. S. Expl. Exp., Crust., pt. I. p. 317: Heller, Novara Crust. p. 38: Hilgendorf, in v. d. Decken's Reis. Ost-Afr. III. i. p. 85, and MB. Ak. Berl. 1878, p. 803: Hoffmann, in Pollen and van Dam, Faun. Madagasc., Crust. p. 18: Kossman, Reise roth.



Meer., Crust., p. 53 : Miers, Phil. Trans. Roy. Soc. Vol. 168, 1879, p. 488, and Ann. Mag. Nat. Hist. (5) V. 1880, p. 310, and Zool. H. M. S. Alert, pp. 518, 541, and Challenger Brachyura, p. 244 : Richters, in Möbius Mceresf. Maurit., p. 155 : Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, p. 148, pl. x. fig. 22 : de Man, Notes Leyden Mus. II. 1880, p. 69, and Journ. Linn. Soc., Zool., XXII. 1887-88, p. 118 pl. viii. fig. 5-7, and Archiv f. Naturges. LIII. 1887, i. p. 353, and Notes Leyden Mus. XIII. 1891, pp. 23, 39, and in Weber's Zool. Ergebn. Niederl. Ost-Ind. II. 1892, p. 307, and Zool. Jahrb., Syst., VIII. 1894-95, p. 577 : Lenz & Richters, Abh. Senck. Nat. Ges. Frankf., XII. 1891, p. 423 : F. Müller, Verh. Ges. Basel. VIII. 1886, p. 475 : J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 388 : Ortmann, Zool. Jahrb. Syst. VII. 1893-94, pp. 752, 753, and Jena. Denk. VIII. 1894, p. 57 : Zehntner, Rev. Suisse de Zool. II. 1894, p. 178.

*Gelasinus Carionis*, Edw. (nec Desm.), Hist. Nat. Crust. II. 53.

*Gelasinus porcellanus*, White, P. Z. S. 1847, p. 85, and in Adams and White, Samarang Crust., p. 50 : Milne Edwards, Ann. Sci. Nat., Zool., (3) XVIII. 1852, p. 151 : Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, p. 155.

*Gelasinus perplexus*, Milne Edwards, Ann. Sci. Nat., Zool., (3) XVIII. 1852, p. 150, pl. iv. fig. 18 : A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 274.

? *Gelasinus pulchellus*, Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, pp. 99, 100.

*Uca annulipes*, Ortmann, Zool. Jahrb. Syst. X. 1897-98, pp. 351 and 354 : Nobili, Ann. Mus. Genov. (2) XX. 1899, p. 274 : Doflein, SB. Ak. Münch. XXIX. 1899, p. 193.

Length of the carapace about three-fifths of the greatest breadth at the acute claw-like antero-lateral angles. The posterior border of the dorsum of the carapace—i.e., the border corresponding with the last segment of the sternum—is a good deal over half the greatest breadth of the carapace, so that the lateral borders of the dorsum of the carapace, which are distinctly defined in almost two-thirds of their extent by a fine raised line, are only moderately convergent. The post-gastric and cardiac regions are the only ones that are defined, and they but faintly.

Front, measured between the bases of the eyestalks, from a fifth to a sixth the greatest breadth of the carapace.

Orbits sinuous and considerably oblique ; their upper border defined by a fine raised line which is very distinctly double in a good part of its extent ; their lower border very elegantly and regularly serrated—the teeth increasing in size from within outwards. In the female only there is a short row of granules inside of and parallel with the lower border of the orbit.

In the large cheliped of the adult male the greatest length of the hand (including fingers) is at least three times the length of the carapace : the outer surface of the somewhat rounded arm and of the wrist and hand is smooth to the naked eye, with a few small granules on the inner border of the wrist : the lower border of the palm is obscurely marginate : and on the inner surface of the palm are two salient granular crests, one of these is deeply grooved and nearly vertical and becomes continuous with the dentary edge of the immobile finger, the other.

which is the more prominent, is oblique and runs to the lower border of the same finger. In the adult male the fingers of the large hand are about twice the length of the upper border of the palm: they are not very broad, and owing to the hook-like curve of the dactylus there is a wide space between them when the tips are apposed: the immobile finger is but slightly curved, and is generally shorter than the dactylus, and owing to the presence of an enlarged tooth near the tip, the tip has a characteristic notched-truncate appearance.

The meropodite in the last pair of legs is not at all foliaceous.

The carapace in the adult male is about 11 millim. long and 19 millim. broad.

In the Indian Museum are 300 specimens from all parts of the coast from Karachi on the west to Mergui on the east.

This species is not, as Miers queries, the same as Stimpson's *G. splendidus*, of which we have numerous specimens from Hongkong.

#### 49. *Gelasimus lacteus* (De Haan).

*Ocypode* (*Gelasimus*) *lactea*, De Haan, Faun. Japon., Crust., p. 54, pl. xv. fig. 5.

*Gelasimus lacteus*, Milne Edwards, Ann. Sci. Nat., Zool., (3) XVIII. 1852, pl. iv. fig. 16: Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 100: Miers, P. Z. S. 1879, pp. 20, 36: Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, p. 149, pl. x. fig. 28: Cano, Boll. Soc. Nat. Napol. III. 1889, p. 234: de Man, Notes Leyden Mus. XIII. 1891, p. 22: Ortmann, Zool. Jahrb., Syst., VII. 1893-94, pp. 752, 759.

*Uca lactea*, Ortmann, Zool. Jahrb., Syst., X. 1897-98, pp. 351, 355.

Easily distinguished from *G. annulipes*, which is its nearest relative, by the following characters:—

(1) the carapace is much more nearly quadrangular, the posterior border of its dorsum being between three-fifths and two-thirds of its greatest breadth, and its true lateral borders being parallel, while the lateral borders of its dorsum are nearly so:

(2) in the larger cheliped of the male the outer end of the upper border of the arm, and the inner border of the wrist, are distinctly denticulated; the dactylus is not so strongly hooked, and the end of the immobile finger though obliquely truncate has an acuminate tip—never a notched-truncate tip:

(3) the colour, in spirit specimens, has a sort of livid bloom never seen in *G. annulipes*.

In the Indian Museum are 47 specimens from Karachi and 3 from the Andamans.

#### [*Gelasimus inversus*, Hoffmann.

*Gelasimus inversus*, Hoffmann, in Pollen and van Dam, Faun. Madagasc. Crust. p. 19, pl. iv. figs. 23-26 (1874): Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, p. 155

de Man, Notes Leyden Mus. XIII. 1891, pp. 21, 44, pl. iv. fig. 12: Ortmann, Zool. Jahrb., Syst., VII. 1893-94, p. 751, and Jena. Denk. VIII. 1894, p. 59.

*Gelasimus chlorophthalmus*, Hilgendorf (*nec* Edw.), MB. Ak. Berl. 1878, p. 803 (*apud* de Man).

*Gelasimus Smithii*, Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, p. 144, pl. 9, fig. 14 (*apud* Ortmann).

*Uca inversa*, Ortmann, Zool. Jahrb., Syst., X. 1897-98, p. 351.

There are in the Indian Museum specimens of this species from Madagascar and the Red Sea, and some from Karachi which differ from the type in the form of the dactylus of the large male cheliped, and are here separated as a variety.]

50. *Gelasimus inversus*, var. *sindensis*, nov.

This variety differs from typical *G. inversus* from Madagascar only in having the tip of the dactylus of the large male cheliped simple (instead of furnished with a second tooth that gives it a notched appearance) and the palm of the hand smoother externally.

The species resembles *G. annulipes*, from which it differs in the following characters:—

(1) the lateral borders of the dorsum of the carapace are defined by a fine line which is raised and distinct in the anterior third only, and is a little more oblique:

(2) the lower border of the orbit is much more sinuous, and is either entire or is quite imperceptibly denticulated at its outer angle:

(3) in the large cheliped of the male the arm is trigonal with sharp edges, the upper edge rising into a distinct lobe or crest and the distal end of the inner edge forming a crest or blunt tooth; the inner edge of the wrist is distinctly denticulated, and the upper border of the palm has several longitudinal rows of granules; of the granular ridges on the inner surface of the palm *the lower one that in G. annulipes runs to the lower edge of the immobile finger is absent or, at most, is represented by a smooth and slight swelling*; finally the immobile finger, though as in *G. annulipes* nearly straight and shorter than the dactylus, has a simple not a notch-like tip.

In the Indian Museum are 30 specimens from Karachi. The carapace of the largest specimen is 10 millim. long and 18 millim. broad.

51. *Gelasimus triangularis*, A. M. Edw.

*Gelasimus triangularis*, A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 275: Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, p. 150: de Man, Journ. Linn. Soc., Zool., XXII. 1887-88, p. 119, pl. viii. figs. 8-11, and Notes Leyden Mus. XIII. 1891, p. 22, and in Weber's Zool. Ergebn. Nederl. Ost. Ind. II. 1892, p. 307: and Zool. Jahrb., Syst., VIII. 1894-95, p. 577: J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1903, p. 388.

*Gelasinus perplexus*, Heller (nec Edw.), Novara Crust. p. 38, pl. v. fig. 4.

?? *Gelasinus minor*, Owen, Zool. H. M. S. "Blossom," Crust., p. 79, pl. xxiv. figs. 2, 2a (1839): Milne Edwards, Ann. Sci. Nat., Zool., XVIII. 1852, p. 151: Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, p. 150.

*Uca triangularis*, Nobili, Ann. Mus. Genov. (2) XX. 1899, p. 274.

Length of the carapace about four-sevenths of the greatest breadth, which is at the spine-like antero-lateral angles.

Carapace strongly convex, almost hexagonal, the regions not indicated. The posterior border of the dorsum of the carapace is less than half the greatest breadth, hence not only the lateral borders of the dorsum of the carapace, but also the true lateral borders, are strongly convergent posteriorly, the former being defined by a fine raised line in more than two-thirds of their extent.

Front, as in *G. annulipes*, from a fifth to a sixth the greatest breadth of the carapace.

Orbits sinuous, much oblique: the upper border defined by a fine microscopically-beaded line, which is double in great part; the lower microscopically beaded, serrulate at its outer end.

In the large cheliped of the adult male the hand is about  $2\frac{1}{2}$  times as long as the carapace; the outer surface of the arm, wrist, and hand are smooth to the naked eye; all the borders of the arm are sharply defined and finely serrulate, the inner border of the wrist is finely serrulate, and the upper and lower borders of the palm are marginate and granulate, especially the upper border; and the two oblique granular crests on the inner surface of the arm are in strong relief.

In the large hand the dactylus, in the adult, is from  $1\frac{1}{2}$  to  $1\frac{3}{4}$  times the length of the upper border of the palm; its tip is simply hooked and overhangs the simple upcurved tip of the immobile finger.

The meropodite of the last pair of legs is not nearly so broad as that of the two preceding pairs.

In the Indian Museum are 70 specimens, all but one being from various parts of the Bay of Bengal littoral. The carapace of a large specimen is 10 millim. long and about 18 millim. broad.

The figures of *G. minor*, Owen, agree very well with this species, and if the two names should prove to refer to the same species this name has the precedence.

## 52. *Gelasinus tetragonum* (Herbst).\*

*Cancer marinus*, minor, vociferans, Seba, Thesaurus, III. p. 48, pl. xix. fig. 15.

*Cancer tetragonon*, Herbst, Krabben, I. ii. 257, pl. xx. fig. 110, and III. i. 31.

*Gelasinus tetragonum*, Rüppell, 24 Krab. roth. Meer., p. 25, pl. v. fig. 5: Milne

\* I assume that Herbst used *tetragonon* as a noun substantive in apposition to *Cancer*; it may therefore continue in apposition to *Gelasinus* used as a substantive.

Edwards, Hist. Nat. Crust. II. 52, and Ann. Sci. Nat., Zool., (3) XVIII. 1852, p. 147, pl. iii. fig. 9: Guérin, Voy. Coquille, II. Zool., Crust. p. 10, pl. i. figs. 2, 3: A. Milne Edwards, in Maillard's Pile Réunion, Ann. F., p. 6, and Nouv. Archiv. du Mus. IX. 1873, p. 273: Heller, Novara Crust., p. 37: Hilgendorf, in v. d. Decken's Reisen Ost-Afr. Crust. p. 84: Hoffmann, in Pollen and Van Dam, Faun. Madag. Crust. p. 16: Kossmann, Reis. roth. Meer. Crust. p. 52: Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, p. 143, pl. ix. fig. 11: de Man, Archiv f. Naturges. LIII. 1887, i. p. 353, and Notes Leyden Mus. XIII. 1891, pp. 20, 24, pl. ii. fig. 6: Ortmanu, Zool. Jahrb. Syst. VII. 1893-94, pp. 750, 754: Whitelegge, Mem. Austral. Mus. III. 1897, p. 138.

*Gelasimus Duperreyi*, Guérin, Dana U. S. Expl. Exp. Crust. pt. i. p. 317.

*Uca tetragona*, Ortmanu, Zool. Jahrb., Syst. X. 1897-98, p. 348: Doflein SB. Ak. Münch. XXIX. 1899, p. 193.

Length of the carapace about two-thirds of its greatest breadth at the acute antero-lateral angles. Carapace somewhat pentagonal, markedly convex fore and aft, the regions all recognizable but not strongly defined: though the posterior border of its dorsum is only half its greatest breadth, the true lateral borders are but slightly convergent posteriorly. In the adult male the fine raised line that bounds the dorsal plane on each side is distinct as such only in the neighbourhood of the antero-lateral angles, but in the female it runs much further backwards.

The breadth of the front, measured between the bases of the eyestalks, is about a tenth the greatest breadth of the carapace.

Orbits much oblique, both borders sinuous, the lower border elegantly denticulated throughout.

In the large cheliped of the adult male the upper border of the arm is fairly prominent and the inner border ends in a sharp tooth, quite independent of the constricted-off terminal lobule; the wrist is quite smooth to the naked eye, and has the inner angle sharp but not spiniform; and the hand is about  $2\frac{1}{2}$  times the greatest length of the carapace.

In the hand of this cheliped the palm is, to the naked eye, frosted with very fine granules, some of which in the neighbourhood of a scar near the base of the immobile finger are visible to the naked eye; its upper border is not, and its lower border is but obscurely, defined; and the two oblique crests on its inner surface are mere swellings, often quite faint, and never strongly salient. The fingers are neither broad nor particularly thin: the dactylus, which is about  $1\frac{1}{2}$  times the length of the upper border of the palm, tapers and is somewhat hooked at tip; the immobile finger commonly has two teeth a little enlarged, the second one being near the tip and sometimes giving the tip a somewhat notched (but not truncated) appearance.

The merns of the last pair of legs is not at all foliaceous.

In the Indian Museum are 29 specimens from the Andamans: the carapace of a large one is 17 millim. long and 26 millim. broad.

The "Challenger" specimens referred by Miers to this species have a broad front and are identical with specimens from Hongkong that I take to be *G. splendidus*.

### 53. *Gelasimus Marionis*, Desm.

*Gelasimus Marionis*, Desmarest, Consid. Gen. Crust., p. 124, pl. xiii. fig. 1, and Dict. Sci. Nat. XXVIII. 1823, p. 248: Milne Edwards, Ann. Sci. Nat., Zool., (3) XVIII. 1852, p. 145, pl. iii. fig. 5 (*nec* Hist. Nat. Crust. II. 53): de Man, Notes Leyden Mus. II. 1880, p. 67: Miers, Ann. Mag. Nat. Hist. (5) V. 1880, p. 308: Kingsley, Proc. Ac. Nat. Sci. Philad. XXXII. 1880, p. 141, pl. ix. fig. 8.

*Gelasimus cultrimanus*, White, P. Z. S. 1847, p. 205, Ann. Mag. Nat. Hist. XX. 1847, p. 205, and Samarang Crust. p. 49 (*apud* Miers *loc. cit. supra*).

*Gelasimus cultrimanus* var. *Marionis*, Ortmann Zool. Jahrb. Syst. VII. 1893-94, pp. 750, 754.

Length of the carapace about two-thirds of the greatest breadth, which is at the claw-like antero-lateral angles.

Carapace little convex, all its regions very well defined, the posterior border of its dorsum in the adult male is half its greatest breadth and the true lateral borders are moderately convergent posteriorly: the fine raised line that in some other species defines the greater part of the dorsal plane is here, in the adult male, confined to the neighbourhood of the antero-lateral angles.

The breadth of the front between the bases of the eyestalks is not a fifteenth the greatest breadth of the carapace.

Orbits not very oblique nor very sinuous; the lower border, which is nearly straight, is elegantly crenulate throughout.

In the large cheliped of the adult male the upper border of the arm is prominent and the inner border ends in a sharp tooth, independent of the terminal constricted-off lobule; the upper surface of the wrist is granular, and the inner border of the wrist has a denticle or spinule at its angle; and the hand (fingers included) is about three times the length of the carapace.

This large hand has a curious twist: its palm is compressed and has the upper and lower margins well defined, the outer surface covered with large granules, and the two granular crests on its inner surface fairly prominent: its fingers are broad thin and laminar; the dactylus, which may be four times as long as the upper border of the palm, is shaped like a knife-blade; and in the immobile finger, which has a groove or line of pits along its outer surface, the dentary edge has a simple S-shaped curve.

The merus of the last pair of legs is not at all foliaceous.

In the Indian Museum are 9 specimens from the Andamans. The carapace of a large specimen is 18.5 millim. long and 26.5 millim. broad.

54. *Gelasimus Marionis* var. *nitidus*, Dana.

*Gelasimus vocans*, Milne Edwards, Ann. Sci. Nat., Zool., (3) XVIII. 1852, p. 145, pl. iii. fig. 4 (*nec* Hist. Nat. Crust. II. 54): Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 99: Heller, Novara Crust., p. 37: Hilgendorf, in v. d. Decken's Reis. Ost-Afr., p. 83: A. Milne Edwards, Nonv. Archiv. du Mus. IX. 1873, p. 272: Hoffmann, in Pollen and Van Dam's Fann. Madagasc. Crust. p. 16: Miers, Phil. Trans. Roy. Soc. Vol. 168, 1879, p. 488, and Ann. Mag. Nat. Hist. (5) V. 1880, p. 308, and Challenger Brachyura, p. 242: Richters, in Mobius, Meeresf. Maurit. p. 155: de Man, Notes Leyden Mus. II. 1890, p. 67, and XIII. 1891, p. 23, pl. ii. fig. 5, and Archiv f. Naturges. LIII. 1887, i. p. 352, and in Weber's Zool. Ergebn. Niederl. Ost-Ind. II. 1892, p. 305, and Zool. Jahrb. Syst. VIII. 1894-95, p. 572: Haswell, Cat. Austral. Crust. p. 92.

*Gelasimus nitidus*, Dana, U. S. Expl. Exp. Crust. pt. I, p. 316, pl. xix. figs. 5a-d: Milne Edwards, Ann. Sci. Nat., Zool., (3) XVIII. 1852, p. 147: Thallwitz, Abh. Mus. Dresden, 1890-91, p. 42.

*Gelasimus cultrimanus*, Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, p. 140, pl. ix. fig. 7: Ortmann, Zool. Jahrb., Syst., VII. 1893-94, pp. 750-753, and Jena Denk. VIII. 1894, p. 56.

*Uca cultrimana*, Ortmann, Zool. Jahrb., Syst. X. 1897-98, p. 348.

Differs from *G. Marionis* only in the form of the large hand of the adult male: this member, in var. *nitidus*,

(1) is not much over  $2\frac{1}{2}$  times the length of the carapace, its dactylus being but little more than twice the length of the upper border of the palm:

(2) it has the two oblique granular ridges on the inner surface of the palm remarkably salient:

(3) it has the dentary edge of the immobile finger thrown into a characteristic W-shaped curve owing to the strong projection of two large triangular lobes, and

(4) it has the dactylus somewhat hooked at tip.

In the Indian Museum are 103 specimens, chiefly from the Andamans and Nicobars, but also from the Coromandel and Malabar coasts. The length of the carapace in large specimens is 14 millim., the breadth 21 millim.

55. *Gelasimus acutus*, Stimpson, de Man.

*Gelasimus acutus*, Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 99: Tozzetti, Magenta Crust. p. 107: Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, p. 144: de Man, Journ. Linn. Soc., Zool. XXII. 1887-88, p. 113, pl. vii. figs. 8-9, pl. viii. figs. 1-4, and Notes Leyden Mus. XIII. 1891, p. 21, and in Weber's Zool. Ergebn. Niederl. Ost-Ind. II. 1892, p. 306, and Zool. Jahrb. Syst. VIII. 1894-95, p. 573: Ortmann, Zool. Jahrb., Syst. 1893-94, p. 750.

*Uca acuta*, Doflein, SB. Ak. Münch. XXIX. 1899, p. 193.

Length of the carapace about three-fifths the greatest breadth, which is at the acute wing-like antero-lateral angles.

Carapace strongly convex fore and aft, the regions moderately well defined: its lateral borders are strongly convergent, and still more so are the lateral borders of the dorsal plane, which are defined in more than two-thirds of their extent by a fine raised line: the posterior border of the dorsal plane is contained from  $2\frac{1}{2}$  to  $2\frac{3}{4}$  times in the greatest breadth.

Front, measured between the eye-stalks, about a twelfth the greatest breadth of the carapace, its moulded and bevelled edges do not together take up half its breadth.

Orbits moderately oblique, both upper and lower borders much sinuous; the lower border finely, the upper border still more finely and more distantly crenulate.

In the large cheliped of the adult male all three borders of the arm are well defined, the inner and the lower borders being crenulated, but the inner border having no tooth independent of the terminal constricted-off lobule; the upper surface of the wrist and the outer surface of the palm are closely covered with vesiculous granules; and the hand (fingers included) may be  $3\frac{1}{2}$  times the length of the carapace.

In this large hand the upper and lower borders of the palm are well defined, and of the two oblique granular crests on the inner surface of the palm the upper one that runs to the dentary edge of the immobile finger is short and indistinct: the fingers are not particularly broad or thin, and however the teeth may be disposed, there is always one near the end of each finger that is enlarged so as to give the ends of the fingers, when apposed, a sort of tongs-like or forceps-like grip: the dactylus is from 2 to nearly  $2\frac{2}{3}$  times the length of the upper border of the palm.

The merus of the last pair of legs is distinctly foliaceous.

In the Indian Museum are 92 specimens chiefly from the Sunderbunds and Mergui, but also from Karachi and the Andamans. In a large specimen the carapace is 14 millim. long and 25 broad.

#### 56. *Gelasimus Dussumieri*, Edw.

*Gelasimus Dussumieri*, Milne Edwards, Ann. Sci. Nat. Zool. (3) XVIII. 1852, p. 148, pl. iv. fig. 12: A. Milne Edwards, Nouv. Archiv. du Mus. IV. 1868, p. 71, and IX. 1873, p. 274: Hoffmann in Pollen and van Dam's Faun. Madag. Crust. p. 17, pl. iii. figs. 19-22: Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, p. 145, pl. x. fig. 16: de Man, Notes Leyden Mus. II. 1880, p. 68, and XIII. 1891, pp. 20, 26, and Journ. Linn. Soc. Zool. XXII. 1887-88, p. 108, pl. vii. figs. 2-7, and in Weber's Zool. Ergebn. Niederl. Ost-Ind. II. 1892, p. 306, and Zool. Jahrb., Syst., VIII. 1894-95, p. 576: Lenz and Richters, Abh. Senck. Nat. Ges. Frankf. XII. 1881, p. 423: Haswell, Cat. Austral. Crust. p. 93: Miers, Zool. H. M. S. Alert, pp. 518, 541: Ortmann, Zool. Jahrb. Syst. VII. 1893-04, pp. 750, 755.



*Gelasimus longidigitum*, Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, p. 144, pl. ix. figs. 10, 13 (*vide* Ortmann l. c. *infra*).

*Uca Dussumieri*, Ortmann, Zool. Jahrb., Syst., X. 1897-98, p. 348: Nobili, Ann. Mus. Genov. (2) XX. 1899, p. 273: Doflein, SB. Ak. Münch. XXIX. 1899, p. 193.

Closely related to *G. acutus*, from which it can be distinguished by the following characters when fully adult males are compared:—

(1) the regions of the carapace are much more strongly defined, and the raised lines that bound the dorsal plane of the carapace on each side are more curved, less rapidly convergent, and less distinct in their posterior part, which gives the carapace a much less posteriorly-contracted look; and the orbits are less oblique:

(2) the front, measured between the bases of the eyestalks, is about a fifteenth the greatest breadth of the carapace, and its moulded and bevelled edges together take up more than two-thirds of its breadth:

(3) in the large cheliped the arm is longer and more slender, both the oblique granular ridges on the inner surface of the palm are very strongly defined, and the fingers may be fully 3 times the length of the upper border of the palm:

(4) these large fingers are broader and thinner, their tips are somewhat hooked and have no enlarged tooth near them, but near the middle of the immobile finger there is a enlarged tooth or triangular lobe:

(5) the merus of the last pair of legs, though it is compressed and somewhat broadened, is not a short foliaceous joint.

In the Indian Museum are 52 specimens, from Mergui, Andamans and Nicobars, and Binlipatam.

### 57. *Gelasimus Urcillei*, Edw.

*Gelasimus Urcillei*, Milne Edwards, Ann. Sci. Nat., Zool., (3) XVIII. 1852, p. 148, pl. iii. fig. 10: Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, p. 145, pl. ix. fig. 15: de Mau, Notes Leyden Mus. XIII. 1891, pp. 21, 34: Ortmann, Zool. Jahrb., Syst. VII. 1893-94, p. 750.

*Gelasimus Dussumieri*, Hilgendorf (*nec* Edw.), in v. d. Decken's Reis. Ost-Afr. Crust. p. 84, pl. iv. fig. 1.

This species closely resembles *G. acutus* and *G. Dussumieri*, but is distinguished from both by the presence of a raised row of granules behind and parallel with the middle third of the lower border of the orbit—i.e., just inside the orbital cavity.

As in *G. acutus*, the fine raised lines that define the dorsal plane of the carapace laterally are distinct throughout and rapidly convergent, which gives the carapace a look of breadth in front and of unusual narrowness behind; and, as in *G. acutus*, the meropodites of the last

pair of legs are, even in the male, decidedly shortened and foliaceous joints.

On the other hand the front is, as in *G. Dussumieri*, extremely narrow, and its bevelled and moulded edges take up most of its breadth between the eye-stalks. The regions of the carapace, also, are as strongly defined as they are in *G. Dussumieri*.

The large hand of the male resembles that of *G. Dussumieri* in having both the oblique granular ridges on the inner surface of the palm strongly salient, and in having very long fingers with simple hooked tips: the fingers however are not so broad and thin, and the lobe near the middle of the dentary edge of the immobile finger may be present or not.

In the Indian Museum are 10 specimens, from Karachi, Madras, and the Nicobars.

The carapace of the largest specimen is 20 millim. long and 36 millim. broad.

#### Subfamily SCOPINERINÆ.

##### DOTILLA, De Haan, Stimpson.

*Dotilla*, De Haan, Faun. Japon. Crust. p. 24 (1835) *nom. præoc.*: Milne Edwards, Hist. Nat. Crust. II. 38, and Ann. Sci. Nat., Zool., (3) XVIII. 1852, p. 152.

*Dotilla*, Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 98.

Cephalothorax so deep as to be subcubical, as long as broad or a little broader than long. Anteriorly the sidewalls of the carapace have a curious gyrous-sulcate sculpture resembling brain-convolutions: often also a similar kind of sculpture is found on the dorsum of the carapace and on the meropodites of the external maxillipeds.

Front a narrow deflexed lobe much as in *Ocypoda*. The orbits, which occupy all the rest of the anterior border of the carapace, are more or less oblique and shallow—in one species so shallow as to be almost obsolete. Eyestalks rather long and slender, with the eyes at the end.

Antennules, like those of *Ocypoda*, having the basal joint of good size, and the flagellum small and hidden by the front. The antennæ stand at the inner angle of the lower orbital border and have a rather short flagellum.

The epistome would be linear but for a large median triangular lobe that projects between the external maxillipeds.

Buccal cavern enormous, suboval or subcircular in outline: the external maxillipeds, which completely cover it and are also very large, have a strong almost hemispherical bulge; their merus is much larger

than the ischium and carries the flagellum at the antero-external angle: the exognath is extremely slender and inconspicuous.

Chelipeds equal, stouter than the legs: fingers usually slender and a little deflexed, usually without conspicuous teeth.

Legs not much differing in length, which is moderate: their meri (as also those of the chelipeds) have on the upper surface a curious membranous area or "tympanum." Similar "tympana" may also be present on some of the segments of the sternum.

The abdomen in the male consists of 7 separate segments, and though narrow is nowhere linear or compressed: the distal end of the fourth segment is thickly fringed with bristles, and overlaps and partly conceals the fifth tergum. In the female, according to De Haan, the abdomen consists of 5 separate segments.

*Distribution*: Tropical shores and mud-flats, from East Africa and the Red Sea eastwards to Japan. Found in the same situations as *Gelasimus* and *Ocypoda*.

*Key to the Indian species of Dotilla.*

- I. Carapace broader than long: chelipeds not much longer than the carapace, and not much differing from the legs in point of length: no "tympana" on the sternum:—
  1. Meropodites of legs not dilated: fingers of chelæ slender, without any conspicuous teeth:—
    - i. Whole surface of merus of external maxillipeds gyrous-sulcate: fingers not longer than palm..... *D. afinis.*
    - ii. Only the outer-half of the merus of the external maxillipeds is gyrous-sulcate:—
      - a. Fingers slightly longer than the palm..... *D. Blanfordi.*
      - b. Fingers more than twice as long as the palm ..... *D. intermedia.*
  2. Meropodites of the legs dilated:—
    - i. Fingers of chelæ without any conspicuous tooth: dactyli of the legs, even of the last pair, shorter than the propodites..... *D. brevitaris.*
    - ii. A large tooth on each finger of the chelæ, arranged so that when the tips of the fingers are closed these large teeth meet, and an hour-glass-shaped space is left between the closed fingers: dactyli of the legs longer than the propodites..... *D. clepsydroductylus.*
- II. Carapace at least as long as broad: chelipeds 3 or 4 times as long as the carapace, and much longer than the legs: "tympana" present on the sternum..... *D. myctiroides.*

58. *Dotilla affinis*, n. sp.

Differs from *D. sulcata*, with specimens of which, from the Red Sea, I have compared it, only in the following characters:—

(1) there is no spine on the under surface of the arm, (2) the fingers are not so long as the palm, (3) there is a small tympanum on the dorsal surface of the merus of the last pair of legs, whereas in *D. sulcata* only the tympanum on the ventral surface is present.

The carapace behind the gastric and inside the branchial regions, forms a smooth semicircular facet, but all its anterior and lateral regions have a curiously convoluted sculpture, the convexities of the convolutions being finely granular.

The grooves that define these convolutions form, when viewed as a whole, a sort of five-rayed star, the anterior ray (which runs up between the eyes on to the front) being the shortest, the antero-lateral rays (which run towards the outer angles of the orbit) being a little longer, and the postero-lateral rays (which really are triple) being the longest of all.

The pterygostomian regions and neighbouring part of the side-walls of the carapace, and the meropodites of the external maxillipeds have the same curious convoluted sculpture. The orbits are shallow but are perfectly defined.

The merus of the external maxillipeds is more than twice the size of the ischium.

Chelipeds (measured round their curve) not twice the length of the carapace: no spine on any of their segments: fingers not so long as the palm.

Legs slightly longer than the chelipeds, their meropodites not at all broadened but all having a "tympanum": except in the case of the last pair of legs—in which the dactylus is remarkably long—the dactyli are rather shorter than the propodites.

No tympana on the sternum.

In the Indian Museum are 4 specimens from Aden and the Baluchistan coast. The carapace of the largest is 5.3 millim. long and 7.3 millim. broad.

59. *Dotilla intermedia*, de Man.

*Dotilla intermedia*, de Man, Journ. Linn. Soc., Zool., XXII. 1887-88, p. 135, pl. ix. figs. 4-6 (1888).

Carapace sculptured in much the same way as in *D. affinis*, only the grooves are not so deep and distinct, and there is an additional groove running parallel with the posterior margin.

The merus of the external maxillipeds is not twice as large as the ischium, and the sculpturing consists of a single loop parallel with the outer border of the merus, the inner half of that joint being quite smooth.

Fingers more than twice as long as the palm. In the last pair of legs the dactylus is about twice as long as the propodite: in all the other legs the dactyli are very little longer than the propodites.

In other respects this species agrees with *D. affinis*.

In the Indian Museum are 15 specimens from Mergui. The carapace is 4 millim. long and a little over 4 millim. broad.

#### 60. *Dotilla Blanfordi*, n. sp.

The whole of the dorsal surface of the carapace is areolated and grooved (the areolæ being finely granular and the grooves smooth) as follows:—

A very distinct groove runs parallel with either lateral border, and a scarcely less distinct one runs parallel with the posterior border, and in the space bounded by these grooves a six-rayed star of grooves of nearly equal length can be made out. This "star" is formed by a groove running fore and aft down the middle of the carapace and having, on either side of it, a semicircular chord joining the outer angle of the orbit with a point near the postero-lateral angle of the carapace. The intersection of these grooves cuts the post-gastric sub-region into 4 symmetrical tubercles.

The whole side-wall of the carapace is finely granular, and the sub-hepatic and pterygostomian regions have the characteristic convoluted sculpture. The orbits are shallow but are perfect.

The external maxillipeds are finely granular: the merus is twice as big as the ischium, and its sculpture consists of a single loop parallel with the outer border and a single groove parallel with the inner border.

Chelipeds as in *D. affinis*, except that the fingers are a little longer than the palm.

Legs as in *D. affinis*, the meropodites being slender and all having a "tympaanum," but in the last pair the dactylus is about twice as long as the propodite, and in the other pairs the dactyli are very slightly longer than the propodites. \*No sternal tympana.

In the Indian Museum are 4 specimens from the coast of Sind and Baluchistan. The carapace of the type is a little over 5 millim. long and not quite 7 millim. broad. Collected by Mr. W. T. Blanford, F.R.S.

61. *Dotilla clepsydrodactylus*, n. sp.

Near *D. Wichmanni*, de Man.

The sculpture of the dorsum of the carapace is like that of *D. Blanfordi*, only the grooves are much deeper cut and the groove between the post-gastric region and the postero-lateral angle of the carapace is double: the sculpture of the sidewall of the carapace is like that of *D. Blanfordi*.

In the external maxillipeds the merus is not twice as big as the ischium, and its sculpture consists of a single simple convolution parallel with the outer border, the inner half of its surface being quite smooth—as is *D. intermedia*.

The orbits are shallow but are quite perfect.

The chelipeds, measured all round their curve, are not twice the length of the carapace and have no spine on the arm. The fingers are much longer than the palm: *in the adult male they are extremely slender, and each has a large tooth arranged so that when the tips of the fingers are closely apposed these two teeth meet, and leave an hour-glass-shaped space between the closed fingers.*

Legs a little longer than the chelipeds; their meropodites are slightly but distinctly dilated and all have a *tympanum*: their dactyli are all longer than their propodites, and in the last pair the dactylus is very long, slender, straight, and fluted. No sternal tympana.

Colours, speckled like the sand in which they live.

In the Indian Museum are eight specimens from False Point on the sea face of the Mahanaddi Delta. The carapace of the largest is 5 millim. long and 6 millim. broad.

62. *Dotilla brevitaris*, de Man.

*Dotilla brevitaris*, de Man, Journ. Linn. Soc., Zool., XXII. 1887-88, p. 180, pl. ix. figs. 1-3 (1888).

The whole carapace is grooved and areolated (but the sculpture is not very deep) as follows:—

A strong groove runs fore and aft down the middle of the carapace, another runs parallel with the posterior border, and on each side another takes a sinuous course along each lateral border: other short and rather indefinite grooves join the median and lateral grooves.

The subhepatic and pterygostomial regions have the usual convoluted sculpture. Orbits shallow, but distinct.

The merus of the external maxillipeds is much larger than the ischium: its whole surface is sculptured, the sculpture taking the form of a W-shaped convolution.

Chelipeds short, without any spine on the arm: palm short, high, and compressed, with sharp edges, traversed by a fine raised line near and parallel with the lower border: fingers thin and compressed, about as long as the palm, the upper edge of the dactylus—like that of the palm—fringed with hair.

Legs a little longer than the chelipeds, the meropodites—especially of the first 3 pairs—*much broadened and compressed*, all having a tympanum. *The dactyli, even of the last pair of legs, are shorter than the propodites.*

No tympana on the sternum.

In the Indian Museum are fragments of 3 specimens from Mergui: de Man states that the breadth of the cephalothorax of the largest specimen is nearly 10 millim.

### 63. *Dotilla myctiroides*, Edw.

*Dotto myctiroides*, Milne Edwards, Ann. Sci. Nat. Zool. (3) XVIII. 1852, pl. iv. fig. 24.

*Dotilla myctiroides*, Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 98: A. O. Walker, Journ. Linn. Soc. Zool. XX. p. 111: Aurivillius, Zur Biologie amphibischer Dekapoden, p. 5, pl. i. figs. 1–13, pl. iii. fig. 13, (Mitg. Ges. Wiss. Upsala, 1893).

*Scopimera myctiroides*, Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 390.

Carapace about as long as, or slightly longer than, broad, little sculptured dorsally, though its antero-lateral parts are studded with vesiculous granules. Front grooved: a groove runs parallel with either lateral border, and a faint groove crosses either postero-lateral angle. The side-walls anteriorly have the usual "brain-couvolution" sculpture.

Orbits very oblique and very shallow, almost obsolete.

The merus of the external maxillipeds is nearly twice as big as the ischium and is finely granular; a single faint groove, most distinct anteriorly, runs parallel with its outer border.

Chelipeds between three and four times the length of the carapace, all the joints long, slender, and unarmed: fingers longer than the palm, without any conspicuous teeth.

Legs long, but much shorter than the chelipeds: the meropodites strongly dilated, and with a large "tympanum": the dactylus of the last pair is longer than the propodite, but in the other three pairs it is a little shorter than the propodite.

On either side of each of the last four thoracic sterna is a large tympanum.

In the Indian Museum are 19 specimens from the Andamans and 11 from the Coromandel coast. The carapace is 10 millim. long.

## SCOPIMERA, De Haan.

*Scopimera*, De Haan, Faun. Japon. Crust., p. 24 (1835): Milne Edwards, Ann. Sci. Nat., Zool., (3) XVIII. 1852, p. 153.

*Scopimera* has the same deep "cubical" carapace and the same general facies as *Dotilla*, but differs in the following characters:—

The carapace is much broader than long and has none of the curious sculpture, resembling brain convolutions, that is found, at any rate on the sidewalls, in *Dotilla*: the external maxillipeds are unsculptured and their merus, though large, is smaller than their ischium: the abdomen of the male has a curious wasp-like form owing to the length and narrowness of its fifth segment, which segment may even become elongate-linear by constriction; it has no bristles either on the 4th tergum or elsewhere: in the female the abdomen consists of 7 separate segments.

*Distribution*: Indo-Pacific shores, from Karachi to Japan.

*Key to the Indian species of Scopimera.*

- I. Chelipeds and legs with a reticulate or subsquamiform granulation, the chelipeds in the male about twice the length of the carapace: most of the tympana on the legs are traversed by a longitudinal ridge: fifth abdominal tergum of male long and narrow, but not linear..... *S. investigatoris*.
- II. Chelipeds and legs finely and uniformly granular, the chelipeds in the male nearer 3 times than twice the length of the carapace: the tympana not subdivided by a ridge: the fifth abdominal tergum of the male is long and linear..... *S. crabricauda*.

According to F. Müller, *S. globosa*, De Haan, is found in Indian waters. The form of the abdomen in this species is similar to that of *S. investigatoris*, but the carapace is smooth, and the tympana of the legs are different.

64. *Scopimera investigatoris*, n. sp.

Carapace much broader than long, decidedly pentagonal, without distinction of regions, smooth except anteriorly and laterally where there are numerous irregularly-scattered granules: the sidewalls and pterygostomial regions finely granular.

Orbits broad as in *Ocypoda*, shallow, the upper border very oblique, the lower border finely denticulated and very prominent as in *Gelasimus*.

External maxillipeds with some obsolescent granulation. Chelipeds and legs finely granular in a somewhat reticulate or subsquamiform way.



Chelipeds about twice as long as the carapace: tympanum on the inner surface of the arm large, that on the outer surface of the arm small: fingers about as long as the palm, without any enlarged teeth.

First 3 pairs of legs about the same length as the chelipeds, the 4th pair shorter: the merus of all much dilated and with large well-defined tympana, all of which, except only the one on the dorsal surface of the last pair, are longitudinally subdivided by a fine ridge: the dactylus in the first 3 pairs is about the same length as the propodite, but in the last pair is considerably longer.

In the male abdomen the first 2 segments are horizontal-linear, the 3rd and 4th, though distinct, form a "butterfly" plate, the 5th is long and narrow and longitudinally grooved and gradually expands to meet the 6th, which is long and broad, while the 7th is transversely oval.

In the female the abdomen is of the usual shape, but in its broadest part is little more than half the breadth of the sternum.

In the Indian Museum are 11 specimens, from Diamond Island off C. Negrais in Burma. The carapace of the largest male is 4.5 millim. long and 7 millim. broad.

65. *Scopimera crabricaula*, n. sp.

Carapace subpentagonal, the regions indistinctly indicated, the surface of the mid-dorsal region is symmetrically puckered or vesiculous; the sidewalls and pterygostomial regions granular.

Orbits moderately broad and deep, the upper border oblique, the lower border prominent and finely denticulate.

External maxillipeds smooth: chelipeds and legs "frosted" under the lens.

In the male the chelipeds are more than  $2\frac{1}{2}$  times the length of the carapace and are longer and much stouter than the legs: there is a large tympanum on the inner surface of the arm, and a very small one on the outer surface: the dactylus is a little shorter than the palm and has one large tooth. In the female the chelipeds are shorter and not much stouter than the legs: the fingers are shorter than the palm, and the dactylus has no large tooth.

The meropodites of the legs are much dilated: all have tympana but these are not subdivided by any ridge: in the first 3 pairs of legs the dactyli are a little longer, in the fourth pair considerably longer, than the propodites.

In the male abdomen the first 2 segments are linear-horizontal and concealed, the 3rd and 4th form a triangular plate deeply grooved down

the middle line, the 5th is long linear and grooved, the 6th and 7th, though separate, together form a racket-head.

In the female the abdomen is of normal shape.

In the Indian Museum are a male and female from Karachi. The carapace of the male is 6.5 millim. long and barely 10 millim. broad.

#### TYMPANOMERUS, de Man, Rathbun.

*Diosippe*, de Man, Journ. Linn. Soc., Zool., XXII. 1887-88, p. 137 (1888): *nom. præocc.*

*Tympanomerus*, Rathbun, Proc. Biol. Soc., Washington, XI. 1897, p. 164.

Carapace deep, quadrilateral, broader than long, the regions not defined. Front narrow, deflexed: the orbits are trenches occupying the whole anterior border of the carapace between the front and the antero-lateral angles.

Eyes, antennules, antennæ and epistome as in *Dotilla*. Buccal cavern large, a little narrowed and rounded anteriorly: the external maxillipeds completely close the buccal cavern, the anterior outer corner of the ischium is marked off as a distinct facet as in *Dotilla* and *Scopimera*, the merus is much larger than the ischium, the palp arises near the antero-external angle of the merus, and the exognath is small and linear.

Chelipeds in both sexes stouter, and in the male longer, than the legs: fingers a little deflexed.

Legs rather compressed, the two middle pairs a little longer than the first and last pair: there are ill-defined tympana on the meropodites.

The abdomen in both sexes consists of separate segments, and in the male is narrow.

*Distribution*: Japanese and Andaman Seas.

The name *Tympanomerus* is a most unfortunate one, since the "tympana," compared with those of *Dotilla* and *Scopimera*, are ill-defined and inconspicuous.

#### 66. *Tympanomerus orientalis* (de Man).

*Diosippe orientalis*, de Man, Journ. Linn. Soc. Zool. XXII. 1887-88, p. 138, pl. ix. figs. 8-10.

Carapace square-cut, the length about four-fifths of the greatest breadth, dorsally nearly flat with the lateral borders well defined especially anteriorly, the surface a little lumpy in places: a perfectly straight fine transverse ridge runs close to and parallel with the posterior border.

Front grooved dorsally, hardly a fourth the breadth of the carapace. The outer angle of the lower border of the orbit forms a

prominent tooth. The merus of the external maxillipeds is grooved along the outer border.

Chelipeds in the male nearly three times the length of the carapace: wrist elongate, somewhat cuboid, with a strong laterally-compressed lobe or tooth at its inner angle: palm rather high, both borders marginate and a second fine ridge runs close to and parallel with the lower border: fingers a little shorter than the palm, finely denticulate.

In the female the chelipeds are not twice the length of the carapace, the wrist is not elongate, though the tooth at its inner angle is present, and the fingers are a little longer than the palm.

The meropodites of the legs are slightly dilated, the dactyli are shorter than the propodites, and the carpopodites and propodites of the first two pairs are densely tomentose.

The fifth abdominal tergum of the male, though not particularly elongate, is a little constricted at base.

In the Indian Museum are 6 specimens from Mergui. The carapace of the largest is 4 millim. long and 5 millim. broad.

#### Subfamily MACROPHALMINÆ, Dana.

##### CLISTOSTOMA, De Haan restr.

*Cleistostoma* (= *dilata* nec *pusilla*) De Haan, Faun. Japon. Crust. p. 26: Milne Edwards, Ann. Sci. Nat., Zool., (3) XVIII. 1852, p. 160.

Carapace of no great depth, broader than long, its sides slightly arched, its regions ill-defined.

Front of moderate breadth, more than a fourth the greatest breadth of the carapace, declivous: orbits well defined, of good depth, occupying all the rest of the anterior border of the carapace: eyestalks stout, eyes terminal. The antennules fold obliquely: the antennæ are small and stand in the inner orbital hiatus.

Epistome well defined, very short fore and aft, with a prominent lobe or tooth in the middle line projecting between the external maxillipeds.

Buccal cavern squarish, but with the sides a little arched, completely closed by the external maxillipeds. These are large, and have the inner angle of the ischium strongly produced, the merus as large as or larger than the ischium, and the palp articulating at the antero-external angle of the merus: the carpus is ovate, but the two terminal joints are very short and slender: the exognath is in great part concealed.

Chelipeds in the female shorter and slenderer than any of the legs, in form exactly like those of the female of *Gelasimus*.

Of the legs the first two pairs are the shortest and slenderest, while the middle two pairs are much the largest and have very broad meropodites. There are no "tympana."

The abdomen of the female consists of 7 separate segments, and is very broad.

67. *Clistostoma dotilliforme*, n. sp.

Carapace rather depressed, slightly convex, smooth, with the regions ill-defined; its lateral borders are slightly arched and are finely serrated anteriorly behind the acute, almost dentiform, antero-lateral angles. Front between a third and a fourth the greatest breadth of the carapace, concave in the middle line. Upper border of the orbit sinuous, lower border prominent and finely serrated.

Merus of the external maxillipeds larger than the ischium, sculptured (somewhat as in the *Dotillæ*) with a sort of Y-shaped sulcus starting from the antero-external angle. The pterygostomian regions also are sculptured with branching or convoluted grooves much as in the *Dotillæ*.

The second and third pair of legs, which are much longer than the other two pair, are a little over  $1\frac{1}{2}$  times the length of the carapace and have an almost foliaceous meropodite with the anterior border finely serrulate and the posterior border elegantly spinate: the anterior border of the carpus and propodite of the second and third pair of legs is tomentose.

A single egg-laden female is in the Indian Museum: it was found at Karachi, and its carapace is 7 millim. long and 9 millim. broad.

TYLODIPLAX, de Man.

*Tylodiplax*, de Man, Zool. Jahrb., Syst. VIII. 1894-95, p. 598 (1895).

Carapace deepish, quite flat dorsally, broader than long and broader behind than in front, the lateral borders being posteriorly divergent and having a distinctly convex curve, the regions more or less defined.

Front between a third and a fourth the greatest breadth of the carapace, not deflexed, grooved longitudinally. The orbits occupy the rest of the anterior border of the carapace, but as the extent of this border is a good deal less than the greatest breadth of the carapace, and as the front is broad, the orbits have not the same elongate form as they have in most species of *Macrophthalmus*, though otherwise similar. Antennules and antennæ as in *Macrophthalmus*. Eyes small, not terminal on the eyestalks.

The epistome would be linear, were it not for a septum-like fold or lobe that projects strongly between the meropodites of the external maxillipeds: owing to this fold the anterior edge of the buccal cavern has a bilobed appearance. The external maxillipeds completely close the buccal cavern: their merus is at least as long as and decidedly broader than their ischium: the flagellum, which is slender, is articulated near, but not at, the antero-external angle of the merus: the exognath is not much concealed, though not completely exposed.

The chelipeds in the adult male are unknown: in the young male they are equal and are shorter and slenderer than the legs, except perhaps the very small 4th pair.

The legs have somewhat the same relations as in *Macrophthalmus*—i.e., the first and last pairs are much the shorter and the two middle pairs are much the longer and stouter.

The abdomen in the female is unknown: in the male it is narrow, and consists of 5 separate joints, the 3rd 4th and 5th segments being fused, but without obliteration of sutures.

It seems to me of very doubtful utility to separate this form from *Paracleistostoma*, de Man, or either of them from *Cleistostoma*, De Haan (as restricted by de Man).

#### 68. *Tylodiplax indica*, n. sp.

Two young males from Karachi are in the Indian Museum: their chelipeds are still of the female *Macrophthalmus* type, so that it is impossible to give a complete diagnosis of the species.

Carapace more or less hairy, finely punctate, its length less than two-thirds its greatest breadth which, owing to the strong divergence, from before backwards, of the lateral borders, is posterior; its antero-lateral angle is an obtuse angle. The gastric region is defined by a perfectly circular line.

Front square-cut, laminar, but not projecting beyond the inner angles of the orbits, from which it is separated by a groove: the front is concave in the middle line.

The pigment of the eyes is small in amount, and is placed some distance behind the end of the eyestalks.

The merus of the external maxillipeds is longer and much broader than the ischium, and has its antero-external angle considerably dilated, and its surface somewhat granular.

The chelipeds of the immature male, and the legs, are hairy, much as in *Macrophthalmus depressus*, the hairs on the posterior border of the merus of the 2nd pair of legs and on the dorsal surface of carpus and propodite of the 2nd and 3rd pair of legs being particularly

thickset. The length of the longest (second) pair of legs is  $2\frac{1}{3}$  times that of the carapace, that of the last pair of legs is very little more than that of the carapace.

Two young males from Karachi: the carapace 6.5 millim. long and 11 millim. broad.

#### MACROPHTHALMUS, Latreille.

*Macrophthalmus*, Latreille, in Cuvier Règne An. (ed. 2) Vol. IV. p. 44 (1829): De Haan, Faun. Japon. Crust. p. 26: Milne Edwards, Hist. Nat. Crust. II. 63, and Ann. Sci. Nat., Zool. (3) XVIII. 1852, p. 155: Dana, U. S. Expl. Exp., Crust. pt. I. p. 312: Miers, Challenger Brachyura, p. 248.

Carapace depressed, quadrilateral, broader than (sometimes more than twice as broad as) long: the regions are well defined, the cervical and branchial grooves being characteristically conspicuous both on the dorsum of the carapace, and on the lateral border where they cut out two prominent teeth or lobes.

Front deflexed, narrow, often a narrow lobe as in *Gelasimus*: its free edge never approaches the epistome. The orbits are narrow trenches occupying the whole anterior border of the carapace between the front and the antero-lateral angles: eyestalks usually very long and slender, as in *Gelasimus*. The antennular flagella, which are rather small, fold transversely beneath, but are not concealed by, the front. The antennæ stand at the inner angle of the orbit: the basal joint is short, and the flagellum is of good length.

Epistome very short fore and aft, almost linear, but well delimited from the palate. Buccal cavern somewhat arched anteriorly. The external maxillipeds have a broad foliaceous ischium and merus (the latter about half the length of the former) and a coarse flagellum articulating with the antero-external angle of the merus: though the ischium and merus may not quite meet across the middle of the buccal cavern, the narrow interval that may exist between them is largely filled by the flagella, so that the underlying parts are concealed.

The chelipeds differ greatly in the sexes: in the female they are equal, and are shorter and slenderer than any of the legs except, perhaps, the short and weak last pair: in the *adult* male they are equal or subequal, and are longer and stouter than any of the legs except, perhaps, the particularly large and stout penultimate pair: in both sexes the fingers are curiously deflexed and bent or curved inwards distally.

Of the legs, the first and last pairs are usually singularly short and slender compared with the second and third pairs: the third pair are the longest and stoutest, being nearly or quite as large as the chelipeds,

and the fourth (last) pair much the shortest and weakest of all. The dactylus in all is broad, stout, and laterally compressed.

The abdomen in both sexes consists of 7 separate segments, and in the male is narrower at base than the breadth of the sternum.

*Key to the Indian species of Macrophthalmus.*

- I. Carapace much broader than long, its sides are distinctly convergent posteriorly and the antero-lateral angles are acute and spiniform: front narrow:—
  1. The eyestalks project nearly half their length beyond the antero-lateral angles of the carapace ..... *M. Ferreauxi.*
  2. The eyestalks project slightly beyond the antero-lateral angles of the carapace: the true first tooth of the lateral border of the carapace belongs to the upper border of the orbit, and the antero-lateral angle of the carapace is formed by the true second tooth..... *M. sulcatus.*
  3. The eyestalks do not project beyond the antero-lateral angles of the carapace:—
    - i. Some of the borders of some of the leg joints are denticulate or spiny..... *M. pectinipes.*
    - ii. Legs smooth, except for a small subterminal denticle on the anterior border of the meropodites ..... *M. convexus.*
- II. Carapace broader than long, its sides are parallel:—
  1. The tooth at the antero-lateral angle of the carapace is truncate and square-cut: front about an eighth the greatest breadth of the carapace: inner surface of the palm of the male smooth..... *M. depressus.*
  2. Front about a fourth the greatest breadth of the carapace: inner surface of the palm of the male armed with a spine..... *M. erato.*
- III. Carapace broader than long, its sides divergent posteriorly: two nearly parallel, obliquely longitudinal, finely beaded lines on the posterior part of each epibranchial region ..... *M. tomentosus.*

Besides the fore-named, the four following species, of which I have not seen specimens, are said to occur in Indian Seas:—

(1) *M. simplicipes*, Guérin, Mag. de Zool. II. 1838, pl. xxiv. fig. 1: it appears to differ from *M. pectinipes* in having no spines or denticles on the leg-joints.

(2) *M. carinimanus*, Milne Edwards, Hist. Nat. Crust. II. 65, and Ann. Sci. Nat. Zool. (3) XVIII. 1852, p. 156: it appears to differ from *M. convexus* only in having a spine on the inner surface of the palm of the male cheliped.

(3) *M. pacificus*, Dana, U. S. Expl. Exp., Crust. pt. I. p. 314, pl. xix. fig. 4: it appears to differ from *M. erato* only in not having a spine on the inner surface of the palm of the male cheliped.

*M. bicarinatus*, Heller, Novara Crust. p. 86, pl. iv. fig. 2, which I am unable from the descriptions to distinguish from *M. pacificus*.

69. *Macrophthalmus Verreauxi*, Edw.

*Macrophthalmus Verreauxi*, Milne Edwards, Ann. Sci. Nat., Zool., (3) IX. 1848, p. 358, and XVIII. 1852, p. 155, pl. iv. fig. 25: Hess, Archiv f. Nat. XXXI. 1865, i. pp. 142, 171: de Man, Notes Leyden Mus. II. 1880, p. 184: Haswell, Cat. Austral. Crust. p. 89.

Carapace finely granular on the branchial regions, its length about two-thirds its greatest breadth, its sides slightly convergent posteriorly and cut anteriorly into 3 teeth, the first of which is the antero-lateral angle.

Front only very moderately deflexed, its least breadth (between the eyestalks) is about a fifth the greatest breadth of the carapace, very obscurely bilobed.

Orbits oblique, sinuous, their borders microscopically beaded. *The eyestalks project nearly half their length beyond the antero-lateral angles of the carapace.*

The external maxillipeds, when the flagella are folded, completely occlude the buccal cavern: the suture between the merus and ischium is oblique.

The legs are darkly variegated or incompletely banded, and are unarmed except for a subterminal spine on the anterior border of the meropodites of the first 3 pairs.

The chelipeds in the young male are not as long as, though more massive than, the 2nd and 3rd pairs of legs.

In the Indian Museum are 4 specimens, more or less damaged, from the Andamans and Mergui ("Investigator" collection). The largest male (which wants the chelipeds) has a carapace 9 millim. long and 14 millim. broad.

70. *Macrophthalmus pectinipes*, Guérin.

*Macrophthalmus pectinipes*, Guérin, Voy. Favorite, p. 167, pl. 49 (1839), and Mag. de Zool. II. 1839, Crust. (CL VII.) pl. xxiii (1838): Milne Edwards, Ann. Sci. Nat., Zool., (3) XVIII. 1852, p. 158: Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 389: Ortmann, Zool. Jahrb., Syst., X. 1897-98, p. 340.

Carapace studded with large conspicuous pearly granules, its length in the adult male is about six-elevenths of its greatest breadth at the level of the second tooth of the lateral border: the lateral borders are slightly but distinctly convergent posteriorly where they are beaded or denticulate, anteriorly they are cut into three acute teeth the last of which is minute, the first being the outer orbital angle.

The front, measured at its narrowest part between the eyestalks, is barely a sixteenth the greatest breadth of the carapace: its free edge is distinctly bilobed. Orbits sinuous, a little oblique; their upper border



elegantly denticulate, the lower border unevenly crenulate. Eyestalks slender and curved: the eye does not reach to the end of the orbital trench.

When their flagella are folded the external maxillipeds completely occlude the buccal cavern: the suture between the ischium and merus is hardly at all oblique.

In the adult male the chelipeds are from  $2\frac{1}{2}$  to 3 times the length of the carapace and longer than any of the legs except the 3rd (penultimate) pair: except the hand, their joints are not more massive than those of the 2nd and 3rd pair of legs. The arm is trigonal, its inner border being prominent and rising into a crest, on the most convex part of which is a short horny plate, called by de Man the "musical ridge": this border of the arm, as also the inner border and angle of the wrist and the extreme proximal end of the upper border of the palm, is serrated. The palm is nearly as long as the arm and is perfectly smooth and unsculptured, it has a tuft of hair at its extreme distal end, continuous with a thick fringe of hair along the upper border of the dactylus: the dactylus is about two-thirds the greatest length of the palm and has a molariform tooth at its basal end, but there is no such tooth on the immobile finger: the fingers meet only at the distal incumbent end.

In the female and young male the chelipeds are short and slender, a good deal fringed with hair, but unsculptured, and the fingers are longer than the palm.

In both sexes the legs are alike, the 2nd and 3rd pairs being remarkably long and strong and the 1st and 4th (last) pairs being short and comparatively slender. The 3rd pair, which are the longest of all, are from  $2\frac{1}{2}$  to nearly 3 times the length of the carapace, the 4th pair are only about  $1\frac{1}{2}$  times the length of the carapace. In all but the last pair the meropodites carpopodites and propodites are scabrous, the anterior border of all these joints and the distal end of the posterior border of the meropodites being serrated: in the third pair only the posterior border of the propodite is very strongly serrated.

In the Indian Museum are 7 specimens from Karachi and one from Orissa. In a large male specimen the carapace is 35 millim. long and 62 millim. broad.

The great changes that occur in the chelipeds during the growth of the male indicate that caution is necessary in basing specific distinctions on the form of these organs in this genus.

## 71. *Macrophthalmus convexus*, Stimpson.

*Macrophthalmus convexus*, Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 97: Miers, Ann. Mag. Nat. Hist. (5) V. 1880, p. 307: Haswell, Cat. Austral. Crust. p. 89:

de Man, *Archiv f. Naturges.* LIII. 1887, i. p. 354, pl. xv. fig. 4: *Ortmann, Zool. Jahrb., Syst.*, VII. 1893-94, p. 745 and X. 1897-98, pp. 342, 344.

*Macrophthalmus inermis*, A. Milne Edwards, *Ann. Soc. Ent. France*, (4) VII. 1867, p. 286, and *Nouv. Archiv. du Mus.* IX. 1873, p. 277, pl. xii. fig. 5 (*apud de Man*).

Carapace smooth, becoming finely granular near the lateral margins, its length in the male is half, in the female decidedly more than half, its greatest breadth: on either branchial region, behind the branchial groove, are two granular eminences, one behind the other: 3 teeth arranged as in *M. pectinipes* at the anterior end of the posteriorly-convergent lateral borders, the first (outer orbital angle) being the most prominent and much the largest, the third minute.

Front, in its narrowest part between the eyestalks, about one-eleventh the greatest breadth of the carapace, its free edge obscurely bilobed. Orbits considerably oblique, the upper border microscopically beaded, the lower border finely and elegantly serrate. The eyestalks are slender and curved, and the eyes reach to the end of the orbital trench.

The suture between the ischium and merus of the external maxillipeds is decidedly oblique, and there is a distinct gap between these appendages even when their flagellum is folded.

The chelipeds have the same general proportions as in *M. pectinipes*: all the borders of the arm are granular or denticulate, but there is no "musical ridge" on the inner border: a bunch of spinules at the inner angle of the wrist: both borders of the palm, but particularly the lower border, are finely granular, and a fine raised granular line runs along the outer surface of the palm parallel with the lower border: the inner surface of the palm, like that of the fingers, is hairy, but quite smooth and unarmed beneath the hair: there is a small molariform tooth at the base of the dactylus, and a larger one having a forward slant on the immobile finger.

The legs have the same general proportions as in *M. pectinipes*, but they are quite smooth and unarmed, except for a small subterminal spine on the anterior border of the meropodites of the 2nd and 3rd pair.

In the Indian Museum are 5 specimens from the Andamans. The carapace of the largest specimen is 10.5 millim. long and 21.5 millim. broad.

## 72. *Macrophthalmus sulcatus*, Edw.

*Macrophthalmus sulcatus*, Milne Edwards, *Ann. Sci. Nat. Zool.* (3) XVIII. 1852, p. 156: *Ortmann, Zool. Jahrb. Syst.* X. 1897-98, pp. 344, 345 (*nec synon.*).

Carapace free of granules in the female, studded with minute granules in the male, its length in the male only about three-eighths, in the female nearly half, its greatest breadth. On the branchial region,

behind the branchial groove, are, in both sexes, three granular eminences, one behind the other, the last being on the posterior border. The lateral borders are convergent: their true *first* tooth, which in other species is at once the antero-lateral angle of the carapace and the outer angle of the orbit, appears in this species to belong to the *upper* border of the orbit, so that the antero-lateral angle of the carapace is formed by the much larger *second* tooth which also is the *apparent* outer orbital angle.

The least breadth of the front, between the eyestalks, is about an eighth the greatest breadth of the carapace: its free edge is very obscurely bilobed.

Orbits sinuous and oblique: the upper border microscopically beaded and furnished near its outer end with a sharp recurved tooth, which is really the outer orbital angle, though the apparent angle is the much larger tooth of the lateral border of the carapace: the lower orbital border is finely denticulated in its inner two-thirds, but is broken and indistinct beyond this. Eyestalks long, slender, curved: the eyes reach not only beyond the true limits of the orbit, but also beyond the antero-lateral angle of the carapace.

The external maxillipeds do not quite meet across the buccal cavern: the suture between the ischium and merus is decidedly oblique.

The legs and chelipeds have the same general proportions as in *M. pectinipes*, but the legs are unarmed.

In the male chelipeds the anterior border of the arm is hairy and strongly denticulated, but there is no "musical ridge": the inner angle of the wrist and the proximal part of the upper border of the palm are also denticulated. On the outer surface of the palm there is a crest running close to, and parallel with, the lower border; and on the inner surface of the palm, near the middle line, is a longitudinal row of denticles the first one of which is considerably enlarged: the surface above this ridge, as also the inner surface of the fingers, is densely hairy. The dactylus is not nearly two-thirds the length of the palm: the immobile finger, but not the dactylus, has a strong molariform tooth at its basal end.

In the female the chelipeds are short and weak as usual, and the hand is quite smooth and has the borders—but specially the lower border—thin and sharp.

In the Indian Museum are a male and a female from the Andamans: the carapace of the male is 9 millim. long and 24 millim. broad.

### 73. *Macrophthalmus depressus*, Rüpp.

*Macrophthalmus depressus*, Rüppell, 24 Krabben Roth. Meer. p. 19, pl. iv. fig. 6, pl. vi. fig. 13: Milne Edwards, Hist. Nat. Crust. II. 66, and Ann. Sci. Nat. Zool. (3)

XVIII. 1852, p. 159: Heller, SB. Ak. Wien, XLIII. 1861, i. p. 362: de Man, Notes Leyden Mus. III. 1861, p. 255, and Archiv f. Naturges. LIII. 1867, i. pl. xv. fig. 3, and Journ. Linn. Soc., Zool., XXII. 1867-68, p. 124, and Zool. Jahrb., Syst. VIII. 1894-95, p. 578: J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 389: Ortmann, Zool. Jahrb., Syst. VII. 1893-94, p. 745 (?) and X. 1897-98, pp. 341, 342.

*Macrophthalmus affinis*, Guérin, Mag. de Zool. II. 1838, pl. xxiv. fig. 2: Milne Edwards, Ann. Sci. Nat. (3) XVIII. 1852, p. 158: Haswell, Cat. Austral. Crust. p. 88 (*apud* Ortmann).

Carapace studded with minute granules not always plainly visible to the naked eye, its length in the male about two-thirds of its breadth. The lateral borders are parallel and the antero-lateral angle is rather a square-cut lobe than a tooth. On the epibranchial regions, behind the branchial groove, are two nearly parallel obliquely-longitudinal finely-granular lines, the inner of which is faint.

Front, at its narrowest part, about an eighth the breadth of the carapace, longitudinally grooved, but its free edge is straight and not bilobed.

Orbits little sinuous and little oblique, their upper border microscopically, their lower border finely and evenly denticulate. Eyestalks slender, hardly curved, the eyes reach almost to the end of the orbital trenches.

When the flagella are folded there is not much space between the external maxillipeds: the suture between the ischium and merus of these appendages is hardly oblique.

In the male the chelipeds and legs have much the same general proportions as in *M. pectinipes*, but they are unarmed, except for a small subterminal denticle on the anterior border of the meropodites of the first three pairs of legs: on the other hand the inner surface of the joints of the chelipeds, and the upper surface of the leg-joints (especially of the meropodites) are densely hairy. The dactylus is more than two-thirds the length of the palm, which is smooth and unsculptured: there is a molariform tooth near the basal end of the dactylus, and a similar, but less distinct and more oblique, tooth on the immobile finger.

In the Indian Museum are 2 males from Mergui, besides several specimens from Aden. The carapace of the largest specimen is 14 millim. long and 22 millim. broad.

#### 74. *Macrophthalmus erato*, de Man.

*Macrophthalmus erato*, de Man, Journ. Linn. Soc., Zool., XXII. 1867-68, p. 125, pl. viii, figs. 12-14, and Zool. Jahrb. Syst., VIII. 1894-95, p. 579.

Carapace quadrilateral, not granular to the naked eye, its length about two-thirds of its breadth, the cervical groove plain, but the

branchial groove faint: the second tooth of the lateral border is a little more prominent than the first. *Front* about two-ninths the breadth of the carapace, square cut, longitudinally grooved, but not bilobed. Orbits slightly sinuous, hardly oblique: eyestalks little curved, stoutish, not quite reaching end of orbit. In the male the lower border of the orbit is peculiar: it is finely denticulate at its internal extremity and has a small lobule at its outer angle, and in between these it has the form of a prominent deflexed somewhat triangular lobe. In the female the lower border of the orbit is finely crenulate throughout. The external maxillipeds do not quite meet across the buccal cavern, and the suture between their ischium and merus is a little oblique.

All three borders of the arm are serrated, and the inner angle of the wrist and upper border of the arm are very finely denticulated. There is a strong "musical crest" obliquely parallel with the inner border of the arm and in the middle third of that border. Palm longer than the arm, its inner surface is hairy and carries a spine near the carpal end about midway between the upper and lower borders. The fingers are considerably less than two-thirds the length of the palm: there is a molariform tooth at the base of the dactylus and a larger slanting one on the immobile finger.

The upper surface of the legs, especially in the case of the third pair, is hairy.

In the Indian Museum are 4 specimens from Mergui and Akyab: the carapace of the largest specimen is 10 millim. long and 14 millim. broad.

#### 75. *Macrophthalmus tomentosus*, Eyd. and Soul.

*Macrophthalmus tomentosus*, Eydoux and Souleyet, Zool. Voy. Bonite, I. p. 243, pl. iii. fig. 8, (1841): Milne Edwards, Ann. Sci. Nat., Zool., (3) XVIII. 1852, p. 159: A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 279: de Man, Journ. Linn. Soc., Zool., XXII. 1887-88, p. 122.

Carapace studded with very fine granules: its length is about two-thirds its greatest breadth, which is behind the middle of the lateral border, the lateral borders being decidedly divergent posteriorly. On either epibranchial region, behind the branchial groove, are two finely beaded obliquely-longitudinal lines. The first two teeth of the lateral borders are square-cut.

*Front*, in its narrowest part, about one-eleventh the greatest breadth of the carapace; though longitudinally grooved it is not bilobed.

Orbits hardly sinuous, not oblique; their upper border microscopically beaded, their lower border finely crenulate. The eyestalks are hardly curved, and the eyes do not reach to the end of the orbits.

The chelipeds and legs have the same general proportions as in *M. pectinipes*, but are shorter. Chelipeds unarmed and unsculptured, except for some spinules along the inner angle of the wrist and some denticles along the proximal part of the upper border of the palm: in the distal half of the inner border of the arm is a short upstanding horny "musical crest": the borders of the arm and the inner border of the fingers are hairy. The dactylus has a small molariform tooth near the base, and the immobile finger has a much larger one.

The legs are unarmed, except for a small subterminal denticle on the anterior border of the meropodites of the first 3 pairs: the upper surfaces of their joints are more or less hairy.

In the Indian Museum is a single specimen from Mergui: its carapace is 23 millim. long and 84 millim. broad.

### Family MICTYRIDÆ, Dana.

#### MICTYRIS, Latreille.

*Mictyris*, Latreille, Gen. Crust. et Ins. p. 40 (1806), and in Cuvier Règne Animal, III. p. 21: Desmarest, Consid. Gen. Crust. p. 115, and Dict. Sci. Nat. XXVIII. 1823, p. 235: De Haan, Faun. Japon. Crust. p. 24: Milne Edwards, Hist. Nat. Crust. II. 36, and in Cuvier Règne An., Crust. p. 67, and Ann. Sci. Nat., Zool., (3) XVIII. 1852, p. 154: Miers, Challenger Brachyura, p. 278.

Carapace elongate globose, oval but truncated posteriorly by the short and perfectly straight posterior border, the cervical and cardio-branchial grooves well developed and making the regions very distinct and convex, the posterior border fringed with bristles, as is also the apposed very prominent edge of the first abdominal tergum.

The afferent branchial orifice is a singular valvular recess, formed dorsally by a semicircular notch in the margin of the carapace, and ventrally by a curious cup-shaped dilatation of the base of the epipodite of the external maxillipeds.

Front a narrow deflexed lobe as in *Ocypoda*. Orbits represented by a small post-ocular spine, the eyes, which are borne on shortish stalks, being quite unconcealed.

Antennules as in *Ocypoda*, the basal joint being large and exposed, while the flagellum is rudimentary and concealed beneath the front. Antennæ small but well formed, standing in the usual position.

Epistome short lozenge-shaped. Buccal cavity enormous, somewhat oval in outline. External maxillipeds very large and foliaceous, with a hemispherical bulge causing them to face as much laterally as ventrally: their greater part is formed by the ischium, the inner margin of which is hairy, especially at base: the merus is very much smaller

than the ischium and carries the coarse hairy flagellum at its antero-external angle: the exognath is small, slender, and very inconspicuous.

Chelipeds moderately long and rather slender, stouter and a little shorter than the legs; their freest motion is in a vertical plane: the wrist is a rather elongate trigonal obconical joint.

Legs somewhat compressed: the first pair are the longest and the others decrease slightly in length in posterior succession.

The abdomen in both sexes is of a broad truncate-oval shape, the segments from the 2nd to the 6th gradually increasing in length but the 7th being narrow: in both sexes the abdomen is fringed with hairs.

*Distribution*: Indo-Pacific from China and Australia to the Andamans.

In habits the species of *Mictyris* resemble the Ocypodes, Gelasimi and Dotillæ.

### 76. *Mictyris longicarpus*, Latreille.

*Mictyris longicarpus*, Latreille, Gen. Crust. et Ins. p. 41 (1806): Desmarest, Consid. Gen. Crust. p. 115, pl. xi. fig. 2, and Dict. Sci. Nat. XXVIII. p. 236: Guérin, Icon. Règne An. Crust. pl. iv. fig. 4: Milne Edwards, Hist. Nat. Crust. II. 37, and in Cuvier Règne An. Crust. pl. xviii. fig. 2, and Ann. Sci. Nat., Zool., (3) XVIII. 1852, p. 154: Dana, U. S. Expl. Exp. Crust. pt. I. p. 389: Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 99: Hess, Archiv f. Nat. XXXI. 1865, p. 142: Heller, Novara Crust. p. 10: A. Milne Edwards, Nonv. Archiv. du Mus. IX. 1873, p. 276: Tozzetti, Magenta Crust. p. 185, pl. xi. figs. 5, 5a-c: Nauck, Zeits. Wiss. Zool. XXXIV. 1880, p. 22, pl. i. figs. 5-7 (gastric teeth): Haswell, Cat. Austral. Crust. p. 116: Miers, Zool. H. M. S. Alert, pp. 184, 248, and Challenger Brachyura, p. 278: de Man, Archiv f. Naturges. LIII. 1887, i. p. 358, and Notes Leyden Mus. XII. 1890, p. 83: Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 390: Aurivillius, Zur Biol. Amphib. Dekap. p. 38, pl. iii. figs. 10-11 (Mitg. K. Ges. Wiss. Upsala, 1893): Ortmann, Zool. Jahrb. Syst. VII. 1893-94, p. 748, and in Semon's Forachung. Crust. p. 58 (Jena. Denks. VIII): Stead, Zoologist, (4) II. 1898, p. 307: Nobili, Ann. Mus. Genov. (2) XX. 1890, p. 272.

Carapace smooth, the regions moderately convex and dividing the dorsal surface into four lobes: edge of front broadly triangular: *linea anomurica* very distinct.

Chelipeds a little over  $1\frac{1}{2}$  times the length of the carapace: a strong spine at the inner angle of the ischium (sometimes absent in the female): usually some spinules along the distal part of the lower border of the arm: wrist with the upper border of the outer surface marginate, and with a tooth near the middle of the distal border of the inner surface: palm much shorter than the wrist and not much more than half the length of the fingers; the upper and lower borders of its outer surface are marginate, and the middle of its outer surface is traversed by two divergent ridges which are continued along the

fingers: fingers slender and tapering, in the male there is an enlarged tooth near the base of the dactylus.

The legs, like the chelipeds, are rough under the lens: the edges of their propodites and dactyli are finely plumed: none of their joints are dilated: the first pair, which are slightly the longest, are about  $1\frac{3}{4}$  times the length of the carapace.

In the Indian Museum are 5 specimens from the Andamans and 2 from the Nicobars.

### Family HYMENOSOMIDÆ, Ortm.

#### *Key to the Indian Genera or Sub-genera.*

- I. Front conspicuously tridentate: the external maxillipeds do not quite meet across the buccal cavern and their exognath is not hidden in its proximal portion: chelipeds much more massive than the legs ... .. HYMENICUS.
- II. Front broadly triangular, or truncated: the external maxillipeds completely close the buccal cavern and their exognath is completely hidden:—
  1. The interantennular septum is a prominent plate: chelipeds in the male much more massive than the legs ... .. ELAMENA.
  2. The interantennular septum is a mere ridge; chelipeds in both sexes slender, not stouter than the legs ... .. TRIGONOPLEX.

#### ELAMENA, Edw.

*Elamena*, Milne Edwards, Hist. Nat. Crust. II. 33, and Ann. Sci. Nat., Zool., (3) XX. 1853, p. 223: Dana U. S. Expl. Exp. Crust. pt. I. p. 379: A Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 321.

Carapace flat dorsally, thin and almost lamellar, triangular or sub-circular, its edges are usually turned up to form a thin circumscribing ridge and are without any teeth. Front broadly triangular, or sometimes truncated. There are no orbits and the eyes, though they may be hidden beneath the front, are exposed and non-retractile: a small post-ocular tooth may be present or not. The antennules fold beneath the front and are not visible from above when folded: the interantennular septum is a prominent plate. Antennal peduncle slender, the flagellum of no great length.

Epistome well defined and remarkably long fore and aft. Buccal cavern square; the external maxillipeds, which completely close it, have the merus about as large as the ischium, the palp articulating not far from the antero-external angle of the merus, and the exognath slender and concealed.



Chelipeds in the male subequal, massive, especially as to the palm. Legs long and slender.

The abdomen of the male does not quite fill all the space between the last pair of ambulatory legs.

77. *Elamena sindensis*, n. sp.

Carapace broadly piriform, smooth, flat, with no distinction of regions: its edge, which is slightly turned up, is entire and unarmed. Front a prominent broad triangular lamina, somewhat rounded at tip. No post-ocular tooth. Interantennular septum very prominent. Eyes not quite concealed beneath the front.

Male chelipeds about  $1\frac{1}{2}$  times as long as the carapace, palm massive and somewhat swollen, fingers stout and pointed and meeting throughout their length. Female chelipeds little longer than carapace, slender, with a slender palm and longish fingers spooned at tip.

Legs slender, the 1st pair not three times as long as the carapace: in all, there is a distinct tooth at the end of the anterior border of both the merus and carpus, and the dactylus is long compressed and falcate with two or three teeth at the end of its posterior border.

In the Indian Museum are 7 specimens from Karachi: the carapace of a male is 5 millim. long and 6 in greatest breadth.

78. *Elamena truncata* (Stimpson ?).

? *Trigonoplas truncata*, Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 109.

*Elamena truncata*, A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 323: J. B. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 395.

Carapace orbiculate-ovate, smooth, flat, with no distinction of regions, its edge, which is slightly turned up and entire and unarmed, shows the faintest traces of angulation in 2 or 3 places. No post-ocular tooth; eyes quite concealed beneath the front. The front, though it projects slightly beyond the carapace is *broadly truncated*, having its free margin cut quite straight. Interantennular septum very prominent. The female chelipeds and the legs are as in the preceding species, the anterior border of the merus and carpus of all the legs ending in a strong tooth.

In the Indian Museum is a female from the Nicobars.

TRIGONOPLAX, Edw.

*Trigonoplas*, Milne Edwards, Ann. Sci. Nat. Zool. (3) XX. 1853, p. 224.

This is best regarded as a subgenus of *Elamena*, from which it differs only in the following unimportant particulars:—(1) the edge of the carapace is not turned up, (2) the interantennular septum is a mere ridge, (3) the chelipeds in the male, as in the female, are very slender.

79. *Elamena* (*Trigonoplax*) *unguiformis*, De Haan.

*Elamene unguiformis*, De Haan, Faun. Japon. Crust. p. 75, pl. xxix. fig. 1 and pl: H: J. R. Henderson, Trans. Linn. Soc. Zool., (2) V. 1893, p. 394.

*Trigonoplax unguiformis*, Milne Edwards, Ann. Sci. Nat. Zool. (3) XX. 1853, p. 224: Ortmann, Zool. Jahrb., Syst., VII. 1893-94, p. 31.

Carapace smooth, flat, lamellar, broadly pentagonal with the postero-lateral sides about a third as long as any of the others, the regions not defined, the sides entire, unarmed. Front a broad, horizontal, triangular lamina. No post-ocular tooth: eyes not concealed by the front, though the eyestalks are. Interantennular septum a mere ridge.

Epistome as long as broad. Chelipeds and legs smooth and slender.

Chelipeds not stouter than the legs, about  $1\frac{1}{2}$  times as long as the carapace: fingers slender, as long as the slender sub-cylindrical palm, their tips spooned.

The anterior border of the meropodite of all the legs ends in an inconspicuous denticle, the dactylus of all is long, subfalciform, and strongly compressed, and has two or three denticles at the tip of the posterior border. The 2nd and 3rd pair of legs, which are the longest, are more than three times the length of the carapace.

In the Indian Museum are 5 specimens from the Andamans. The carapace of one is 12 millim. long and 14 in greatest breadth.

## HYMENICUS, Dana.

*Hymenicus*, Dana, Amer. Journ. Sci. (2) XII. 1851, p. 290, and U. S. Expl. Exp. Crust. pt. I. p. 387: Milne Edwards, Ann. Sci. Nat., Zool., (3) XX. 1853, p. 224.

Differs from *Elamena* only in the following particulars:—

(1) the front is tridentate and the ridge that defines the edge of the carapace dorsally is continued across its base between the eyes: (2) the interantennular septum, as in *Trigonoplax*, is a mere ridge: (3) on either lateral border of the carapace teeth are sometimes present: (4) the external maxillipeds do not quite meet across the buccal cavern and their exognath is not hidden in its proximal portion.

*Rhynchoplax* of Stimpson (Proc. Ac. Nat. Sci. Philad. 1858, p. 109) is probably synonymous.

Key to the Indian species of *Hymenicus*.

- I. Median spine of the rostrum of moderate length:  
3 teeth on either lateral border of the carapace ... *H. Wood-Masoni*.
- II. Median spine of the rostrum very long: no teeth on  
the lateral borders of the carapace ... *H. inachoides*.

80. *Hymenicus Wood-Masoni*, n. sp.

Body and chelipeds tomentose. Carapace dorsally flat or sunken, longer than broad, circular without the rostrum, the regions demarcated by fine grooves.

The front, which is delimited from the rest of the carapace by a fine raised line running across its base between the eyes, is cut into 3 prominent teeth, the middle one of which is somewhat the largest. The antennules fold beneath the front.

A small post-ocular denticle: a large tooth on the lateral border of the carapace above the base of the 1st pair of legs, another, hardly smaller, midway between this and the front, a third, much smaller, midway between this and the post-ocular denticle.

Chelipeds in the adult male more than twice the length of the carapace, very much stouter than the legs, the palm being specially massive. When denuded, the upper border of the arm is dentate and there is a stout spine near the far end of the outer border of this joint: there are several sharp tubercles on the upper surface of the wrist, the outer surface of the palm is reticulate in places, and the fingers which are stout and as long as the palm, have elegantly interlocking teeth.

In the female the chelipeds are considerably shorter and, though stouter than the legs and formed on the male pattern, are not nearly so stout as in the male.

The legs have long, curved dactyli, which are armed with small recurved teeth at the distal end of the posterior border: the 2nd pair, which are a little the longest, are over  $2\frac{1}{2}$  times the length of the carapace.

Carapace of male (including rostrum) 7.5 millim. long and 6 broad.

Specimens were collected by the late Professor Wood-Mason at Port Blair in the Andamans, and at Port Canning near Calcutta.

81. *Hymenicus inachoides*, n. sp.

Carapace somewhat tomentose, flat, elongate-triangular, ending in a rostrum of three long teeth of which the middle one is about a third the length of the rest of the carapace, the other two being more than half the length of the middle one. The regions are all well defined by grooves. No spines on the lateral borders of the carapace. Post-ocular denticle hardly distinguishable. The antennules fold beneath the front.

Chelipeds of the adult male somewhat tomentose, not  $1\frac{1}{2}$  times the length of the carapace: arm slender, with a tooth near the distal end of the outer border; palm short, high, produced and somewhat swollen below; the fingers a little longer than the palm, stout, and finely toothed.

Legs long and slender, with long dactyli furnished with hook-like teeth at the end of the posterior border: the 2nd pair of legs are nearly three times the length of the carapace.

A single male from Port Canning near Calcutta: its carapace is 8.5 millim. long and 6 millim. in its greatest breadth.

### Family GRAPSIDÆ Dana.

#### *Key to the Indian Genera.*

#### I. The antennules fold beneath the front in the ordinary way:—

##### 1. No oblique hairy ridge on the exposed surface of the external maxillipeds:—

- i. A very wide gap between the external maxillipeds, the exopodites of which appendages are narrow, and the palp of which appendages articulates at or near the antero-external angle of the merus: the abdomen of the male fills all the space between the last pair of ambulatory legs (*Grapsinæ*):—

- A. Front less than half the greatest breadth of the carapace: merus of the external maxillipeds longer than broad:—

- a. Fingers with broad spooned tips: flagellum of exopodite of external maxillipeds well developed. **GRAPSUS.**

- b. Fingers acute, not spooned: flagellum of exopodite of external maxillipeds absent..... **GEOGRAPSUS.**

- B. Front more than half the greatest breadth of the carapace: merus of the external maxillipeds broader than long:—

- a. Antennæ completely excluded from the orbit....., ... **METOGRAPSUS.**

- b. Antennæ in the orbital hiatus... **PACHYGRAPSUS.**

- ii. A moderate gap between the external maxillipeds, the exopodites of which appendages are broad, and the palp of which appendages articulates near the middle of the anterior border of the broad merus: the abdomen of the male does not quite fill all the space between the last pair of legs (*Varuninæ*):—

- A. Exognath of the external maxilliped. not as broad as the ischiognath: terminal joints of legs thin broad and compressed..... **VARUNA.**

- B. Exognath of the external maxillipeds as broad as or broader than the isohognath: dactyli of the legs compressed but not broadened:—
- a. Carapace flat and depressed.... *PTYCHOGNATHUS.*
  - b. Carapace deepish, strongly convex in both directions..... *PYXIDOGNATHUS.*
2. An oblique hairy ridge on the exposed surface of the external maxillipeds (*Sesarmine*):—
- i. Carapace little, sometimes not at all, broader than long, the pterygostomian regions and sidewalls with a sieve-like reticulation: lower border of orbit not abnormally prominent:—
  - A. Antennæ lodged in the orbital hiatus:—
    - a. Carapace nearly square: front abruptly and vertically deflexed..... *SESARMA.*
    - b. Antero-lateral borders of carapace arched: front obliquely deflexed..... *SARMATIUM.*  - B. The tooth at the inner angle of the lower border of the orbit meets the front, so as to exclude the antennæ from the orbit:—
    - a. Carapace dorsally smooth and nude..... *METASEARMA.*
    - b. Carapace dorsally verrucose and densely tomentose..... *CLISTOCCELOMA.*  - ii. Carapace much broader than long, the pterygostomian regions, etc., not reticulated: lower border of orbit prominent beyond the front. Front gradually declivous. General appearance much like *Macrophthalmus*..... *METAPLAX.*
- II. The antennules fold nearly longitudinally in deep notches in the front visible in a dorsal view (*Plagusine*):—
1. Merus of the external maxillipeds of good size and as broad as the ischium..... *PLAGUSIA.*
  2. Merus of the external maxillipeds small and much narrower than the ischium..... *LILOPHUS.*

### Sub-family GRAPSINÆ, Dana (pt.).

#### GRAPSUS, Lamk., Kingsley.

*Grapsus* (part) Lamark, Syst. Anim. Sans Vertèbr.: Latreille, Hist. Nat. Crust. et Ins. VI. p. 56, and Gen. Crust. p. 32.

*Grapsus*, Leach, Trans. Linn. Soc. XI. 1815, pp. 309, 323.

*Grapsus* (part) Desmarest, Consid. Gen. Crust., p. 129, and Dict. Sci. Nat. XXVIII. p. 247: Milne Edwards, Hist. Nat. Crust. II. 83, and Ann. Sci. Nat., Zool. (3) XX. 1853, p. 166: Dana, U. S. Expl. Esp. Crust. pt. I. p. 336.

*Grapsus*, Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, pp. 188 and 192: Miers, Challenger Brachyura, p. 254.

*Goniopsis*, De Haan, Faun. Japon. Crust. p. 33.

Carapace little broader than long, much depressed, the regions fairly well defined, the branchial groove particularly clear, the branchial regions with regular obliquely transverse ridges, the gastric region with a transverse squamiform sculpture. The lateral borders are arched and are armed with a tooth, placed immediately behind the acute outer orbital angle.

Front about half the breadth of the anterior border of the carapace, strongly deflexed: along the line of flexion are 4 tubercles, the outer of which on either side correspond with the supra orbital angles.

Orbits of moderate size, deep, distinctly divided into two fossæ: their lower border is deeply notched near the outer angle: the wide inner orbital hiatus is filled partly by the antennal peduncle and partly by a strong isolated tooth that belongs to the inner of the two fossæ into which the orbit is divided.

The antennules fold nearly transversely in rather narrow fossæ: the interantennular septum is very broad. The antennal flagellum is short, and lies practically in the orbital cavity: the excretory tubercle of the basal antenna-joint is singularly prominent.

Epiatome of good length fore and aft, well defined; its wings run up towards the orbital hiatus. Buccal cavity square with the antero-lateral corners rounded off. The external maxillipeds are widely distant, leaving between them a rhomboidal gap in which the mandibles are exposed: the ischium and merus are both narrow, the merus being slightly shorter than the ischium, and the palp, which is coarse—especially as to its carpus—articulates at the antero-external angle of the merus.

Chelipeds subequal in both sexes and much shorter than the legs, though, in the male, of a somewhat stouter make: hands and fingers short and stout, the tips of the fingers broad and hollowed *en cuillère*.

Legs broad and compressed, especially as to the merus: the dorsal surface of some of the joints has a sort of reticulate or squamiform sculpture, and the dactyli are thorny.

The abdomen in both sexes consists of 7 segments, and in the male its base is as broad as the sternum between the last pair of legs.

*Distribution*: rocks and reefs of all the tropical and subtropical seas.

The *Grapsi* of Indian seas are found in considerable number wherever there are rocks. They live out of water and are very cunning and active: if they cannot succeed in dodging their pursuer they

fling themselves into the sea and in that way escape capture. Their colour in life is a dark|bottle-green.

## 82. *Grapsus grapsus* (Linn.).

Seba, Thesaurus, III, p. 43, pl. xviii. figs. 5, 6.

*Cancer grapsus*, Linnæus, Syst. Nat. (ed. xii.) p. 1048: Fabricius, Ent. Syst. II. p. 438 and Suppl. p. 342.

*Grapsus maculatus* (Catesby, 1743), Milne Edwards, Ann. Sci. Nat. Zool. (3) XX. 1853, p. 167, pl. vi. fig. 1: Hoffmann, in Pollen and Van Dam, Faun. Madagasc., Crust., p. 21: Brocchi, Ann. Sci. Nat., Zool., (6) II. 1875, Art. 2, p. 78 (male appendages): Kingley, Proc. Ac. Nat. Sci. Philad. 1879, p. 401, and 1880, p. 192: de Man, Notes Leyden Mus. V. 1893, p. 159: Miers, Zool. H. M. S. Alert, pp. 518, 544, and Challenger Brachyura, p. 255: Cano, Boll. Soc. Nat. Napol. III. 1889, p. 236: R. I. Pocock, Journ. Linn. Soc., Zool., XX. 1890, p. 512: de Man, Notes Leyden Mus. XIII. 1891, p. 49: Koelbel, Ann. Nat. Hofmus. Wien, VII. 1892, p. 114: Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 391: A. Milne Edwards and Bouvier, Hirondelle Crust. (Monaco, 1894) p. 47: de Man, Zool. Jahrb. Syst. IX. 1895-97, p. 79: Whitelegge, Mem. Austral. Mus. III. 1897, p. 139: Nobili, Boll. Mus. Torino, XII. 1897, p. 3. *Grapsus maculatus* var. *pharaonis*, A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 295.

*Grapsus pictus*, Latreille, Hist. Nat. Crust. et Ins. VI. p. 69, pl. xlvii. fig. 2, and Genera Crust. p. 33: Lamarck, Hist. Nat. Anim. Sans Vert. V. p. 248: Dumeril, Dict. Sci. Nat. XIX. p. 322: Desmarest, Consid. Gen. Crust. p. 130, pl. xvi. fig. 1: Milne Edwards, in Cuvier Règne An. pl. xxii. fig. 1, and Hist. Nat. Crust. II. 86: Milne Edwards and Lucas, Voy. Amer. Merid., Crust. p. 28: Gay, Hist. Fisica Chili, pt. III. Zool. p. 166: Dana, U. S. Expl. Exp. Crust. pt. I. p. 336: Desbonne and Schramm, Crust. Guadal. p. 49: Martens, Archiv f. Nat. XXXVIII. 1872, p. 106: Miers, Cat. Crust. New Zeal. p. 36, and P. Z. S. 1877, p. 73, and Phil. Trans. 1879, p. 489, and Ann. Mag. Nat. Hist. (5) V. 1880, p. 310: Smith, Trans. Connect. Acad. IV. 1880, p. 256: Tenison Woods, Proc. Linn. Soc. N. S. W. V. 1880-81, p. 117: Ozorio, Journ. Sc. Nat. Lisb. XI. 1885-87, p. 227. *Grapsus pictus* var. *ocellatus*, Studer, Abh. Ak. Berlin, 1882, Gazelle Crust. p. 14: *Grapsus pictus* var. *Webbi*, Hilgendorf, SB. Nat. Freunde Ges. 1882, p. 24.

*Grapsus ornatus*, Milne Edwards, Ann. Sci. Nat. Zool. (3) XX. 1853, p. 168.

*Grapsus pharaonis*, Milne Edwards, Ann. Sci. Nat. Zool. (3) XX. 1853, p. 168: Heller, SB. Ak. Wien. XLIII. 1861, i. p. 362: Hoffmann in Pollen and Van Dam, Faun. Madagasc. Crust. p. 20, pl. v. figs. 32-35: Richters, in Mobius, Meeresf. Maurit. Crust. p. 166.

*Grapsus Webbi*, Milne Edwards, Ann. Sci. Nat. (3) XX. 1853, p. 167: Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 102.

*Grapsus altifrons*, Stimpson, Ann. Lyc. Nat. Hist. N. Y. VII. 1862, p. 230.

*Grapsus grapsus*, Ives, Proc. Ac. Nat. Sci. Philad. 1891, p. 190: Ortmann, Zool. Jahrb. Syst. VII. 1893-94, p. 703: Faxon, Mem. Mus. Comp. Zool., XVIII. 1895, p. 30: Rathbun, Proc. U. S. Nat. Mus. XXI. 1898, p. 604.

*Goniopsis picta*, De Haan, Faun. Japon. Crust. p. 33, and Krauss Südafr. Crust. p. 46.

Carapace somewhat discoidal in shape, owing to the curvature of

the sides: its regions well defined: the transverse and oblique ridges are salient, and the surface between the latter is coarsely reticulate.

Front deep and almost vertically deflexed, overhanging the epistome and much concealing the antennules, its free edge crenate.

Length of the epistome one-third or more of its greatest breadth. The tooth at the inner angle of the orbit is blunt.

Chelipeds in the male hardly longer than the carapace, shorter in the female: inner border of ischium and arm strongly spinate, and there are one or two less acute spines at the far end of the outer border of the arm: wrist with fine scattered tubercles on its upper surface, and with its inner angle produced to form a talon-shaped spine: palm nearly as high as long, its outer surface sculptured, its upper border culminating in a tooth: the fingers have very broad rounded tips, and the length of the dactylus in the male is nearly twice the length of the upper border of the palm.

Of the legs the 1st pair are very decidedly the shortest and the 3rd pair the longest, the latter being about twice the length of the carapace: the 4th pair are longer than the first by a dactylus, and shorter than the 2nd by about two-thirds of a dactylus. Only in the last pair of legs does the breadth of the merus approach half the length of the same joint: the far end of the upper border of the merus is spine-like and there are usually 2 or 3 spines at the far end of the lower border.

In the Indian Museum are 18 specimens from the Laccadives, the Andamans, the Coromandel coast, and Ceylon. The carapace of a large specimen is 64 millim. long and 68 millim. broad.

### 83. *Grapsus strigosus* (Herbst).

*Cancer strigosus*, Herbst, Krabben, III. i. p. 55, pl. xlvii. fig. 7. *Grapsus strigosus*, Bosc, Hist. Nat. Crust. I. p. 203: Latreille, Hist. Nat. Crust. et Ins., VI. p. 70, etc.: Milne Edwards, Hist. Nat. Crust. II. 87: Gay, Hist. Fis. Chili, III. Zool. p. 168: Dana, U. S. Expl. Exp. Crust. pt. I. p. 338: Milne Edwards, Ann. Sci. Nat., Zool., (3) XX. 1853, p. 169: Stimpson, Journ. Bost. Soc. Nat. Hist. VI. 1857. p. 466: Kinahan, Journ. Roy. Soc. Dubl. I. 1858, p. 340: Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 102: Hees, Archiv f. Nat. XXXI. 1865, i. pp. 147, 171: Heller, Novara Crust. p. 47: A. Milne Edwards, Nouv. Archiv. du Mus. IV. 1868, p. 71 and IX. 1873, p. 286 (*ubi synon.*): Hilgendorf in v. d. Decken's Reis. Ost-Afr. III. i. p. 87: Hoffmann, in Pollen & Van Dam, Faun. Madag. Crust. p. 20, pl. v. fig. 31: Lockington, Proc. Calif. Acad. VII. 1876, p. 151: Kossmann, Reise roth. Meer., Crust. p. 60: Miers, P. Z. S. 1877, p. 136, and Ann. Mag. Nat. Hist. (5) II. 1878, p. 410: Hilgendorf, MB. Ak. Berl. 1878, p. 808: E. Nauck, Zeits. Wiss., Zool. XXXIV. 1880, p. 32 (*gastric teeth*): Kingsley, Proc. Ac. Nat. Sci. Philad. XXXII. 1880, p. 194: Haswell, Cat. Austral. Crust. p. 97: Miers, Zool. H. M. S. Alert, pp. 518, 544, and Challenger Brachyura, p. 256: Müller, Verh. Nat. Ges. Basel, VIII, p. 475: de Man,



Archiv f. Nat. LIII. 1887, i. p. 365, and Journ. Linn. Soc. Zool. XXII. 1888, p. 148 : Cuno, Boll. Soc. Nap. III. 1889, p. 236 : Walker, Journ. Linn. Soc., Zool., XX. 1886-1890, p. 110 : Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 390 : de Man, Zool. Jahrb. Syst. IX. 1895-97, p. 80 : Ortman, Zool. Jahrb., Syst., 1893-94, p. 705 : Wedenissow, Bull. Soc. Ent. Ital. 1894, p. 415.

*Grapsus albo-lineatus*, Lamarck, Hist. Nat. Anim. Sans Vert. V. p. 249 (*vide* Edw.).

*Goniopsis flavipes*, Macleay, Ill. Ann. S. Africa, p. 66, and Krauss, Sudafr. Crust. p. 46 (*apud* Miers).

*Goniopsis strigosa*, De Haan, Faun. Jap. Crust. p. 33 : Macleay, *loc. cit.* : Krauss, *loc. cit.*

*Grapsus granulatus*, *pelagicus*, and *Peroni*, Milne Edwards, Ann. Sci. Nat. (3) XX. 1853, p. 169 (*vide* A. M. E.).

The chief differences between this species and *G. grapsus* are the following:—

The branchial grooves of the carapace are not so well cut, the transverse and oblique ridges are low and smooth, and the surface between the oblique ridges is quite smooth.

The front is not so deep and is obliquely deflexed, hardly overhanging the epistome and not concealing the antennules, and its free edge is not so distinctly crenulate. The tooth at the inner angle of the orbit is subacute. The length of the epistome is not nearly a third its greatest breadth.

In the chelipeds, the tooth at the inner angle of the wrist is nearly straight, not talon-like, the length of the upper border of the palm is nearly two-thirds the length of the dactylus, and the tips of the fingers are not so broad and blunt.

In the legs the meropodite is broader, its greatest breadth being half its length. Moreover the difference in size between the 1st and 4th pairs of legs is much less marked.

In the Indian Museum are 76 specimens, from the Baluchistan and Sind coast, the Malabar coast, Ceylon, the Coromandel coast, the Arakan and Tenasserim coast, Mergui, the Andamans, and the Nicobars.

The carapace of the largest specimen (a female) is 59 millim. long and 63 millim. broad.

#### GEOGRAPSUS, Stimpson.

*Geograpsus*, Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 101 : Kingsley, Proc. Ac. Nat. Sci. Philad. 1890, pp. 188, 195 : Miers, Challenger Brachynra, p. 260.

*Orthograpsus*, Kingsley, l. c. pp. 188, 194

Closely resembles *Grapsus*, but differs in the following important particulars:—

The carapace is more quadrate, the sides being very little arched, it is also broader and less depressed. The lobe at the inner inferior

angle of the orbit is not so completely isolated. The antennal peduncle is not so massive, nor is its "urinary tubercle" conspicuous. The epistome is shorter fore and aft, and is much less well defined.

The chelipeds are altogether of a different type, being vastly more massive than the legs, and in the adult male at least as long as the longest legs: the fingers are pointed. Though the dactyli of the legs are thorny, they are not so closely covered with thorns, nor are the thorns so coarse, as in *Grapsus*. Between the coxæ of the 2nd and 3rd pair of legs is a narrow fossa fringed with hair leading to the branchial cavity.

The two Indian species of the genus are land-crabs and are found in the jungles of the Andaman and Nicobar islands and in the villages of the Laccadive islands. They are extremely vigilant and active.

#### 84. *Geograpsus Grayi* (Edw.).

*Grapsus Grayi*, Milne Edwards, Ann. Sci. Nat. Zool. (3) XX. 1853, p. 170.

*Geograpsus rubidus*, Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 103.

*Geograpsus Grayi*, A. Milne Edwards, Nonv. Archiv. du Mus. IX. 1873, p. 288: Miers, Phil. Trans. 1879, p. 489, and Zool. H. M. S. Alert, pp. 518, 545, and Challenger Brachyurn, p. 261: Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, p. 196: Richters, in Mobius, Meeresf. Maurit. p. 156: Haswell, Cat. Austral. Crust. p. 98: Ortmann, Zool. Jahrb., Syst., VII. 1893-94, p. 707: de Man, Zool. Jahrb., Syst. IX. 1895-96, p. 80: Nobili, Ann. Mus. Genov. (2) XX. 1899, p. 266.

Carapace subquadrilateral, a little convex, the lateral borders well defined anteriorly, ill defined and slightly convergent posteriorly: transverse markings fine, curved or oblique on the branchial regions, almost invisible on the gastric region.

The four tubercles along the line of flexion of the front are not salient; the edge of the front in a dorsal view is concave. The notch near the outer end of the lower border of the orbit is small and narrow. The epistome is rather ill defined.

Chelipeds in both sexes a little unequal: squamiform markings are present but, except on the arm, are indistinct, as also are the scattered granules on the upper surface of the palm. The larger cheliped may be a little under or a little over twice the length of the carapace. The inner border of the ischium is denticulate, the inner border of the arm is expanded to form a dentate lobe, and the inner angle of the wrist is spiniform.

The greatest breadth of the meropodites of the legs is less than half their length. The first pair of legs are slightly shorter than the 4th: the 2nd pair are the longest of all, being about twice the length of the carapace. The last 3 joints of all the legs are bristly.

Colours in life yellow-ochre, the greater part of the dorsum of the carapace livid bluish or purplish.

In the Indian Museum are 24 specimens from the Andamans, Nicobars, and Laccadives.

The carapace of a large male is 40 millim. long and 49 broad.

### 85. *Geograpsus crinipes* (Dana).

*Grapsus crinipes*, Dana, Proc. Ac. Nat. Sci. Philad. 1851, p. 249, and U. S. Expl. Exp. Crust., pt. I. p. 341, pl. xvi. fig. 6.

*Geograpsus crinipes*, Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 101: Heller, Novara Crust. p. 48: Streets, Bull. U. S. Nat. Mus. VII. 1877, p. 115: Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, p. 196: Ortmann, Zool. Jahrb., Syst. VII. 1893-94, p. 706: de Man, Zool. Jahrb., Syst. IX. 1895-97, p. 83: Whitelegge, Mem. Austral. Mus. III. 1897, p. 139.

*Grapsus rubidus*, Hilgendorf, in v. d. Decken's Reisen Ost-Afr. Crust., p. 87, pl. v.: Hoffmann, in Pollen & Van Dam, Faun. Madagasc. Crust. p. 22.

Differs from *G. Grayi* in the following particulars:—

The carapace is quite flat, and the lateral borders, which are thin and well defined throughout their extent, are slightly *divergent* posteriorly: the transverse markings are distinct and *nearly straight*.

The four tubercles along the line of flexion of the front are salient, and the free edge of the front is quite straight. The notch near the outer end of the lower border of the orbit is large, and the lobule external to the notch is denticulate. The epistome is well defined from the palate by a granular or pectinate ridge.

The chelipeds in the male are nearly equal, but in the *female* they are unequal. The squamiform markings on the arm, wrist, and lower portion of the hand are distinct, as also are the vesiculous granules on the upper surface of the palm and dactylus.

The greatest breadth—near the far end—of the meropodites of the last 3 pairs of legs is *more than half* their length.

Colour in life bright red.

In the Indian Museum are 2 males and a female from the Andamans, a male from the Nicobars, and a female from the Laccadives. The carapace of a female is 40 millim. long and 45 broad.

### METOPOGRAPSUS, Edw.

*Metopograpsus*, Milne Edwards, Ann. Sci. Nat., Zool., (3) XX. 1853, p. 164: Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, pp. 188, 190: Miers, Challenger Brachyura, p. 257.

Carapace quadrate, little broader than long, somewhat depressed, the regions not well defined, the branchial groove distinct, fine oblique

grooves are present on the lateral parts of the branchial regions: the antero-lateral, or outer orbital angle, is acute, but there are no teeth on the lateral border behind it.

Front very broad, more than half the extreme width of the carapace, deflexed: along the line of flexion are four depressed lobes, the outer one of which on either side sometimes shows a tendency to split into two.

Orbits of moderate size, occupying the corners of the carapace: the lower border is notched near its outer end: the orbital hiatus is filled by a special lobe which belongs to the inner of the two fossæ into which the orbit is divided and this lobe completely excludes the antennæ from the orbit. The antennules fold nearly transversely in fossæ of good size. The antennæ have a short and slender flagellum: the basal joint of the peduncle is not very massive.

Epistome well defined, but short fore and aft. Buccal cavity square with the anterior corners rounded off. The external maxillipeds leave between them a rhomboidal gap in which the mandibles are exposed: the merus is shorter than the ischium, and carries the coarse palp at or near the antero-external angle.

Chelipeds either subequal or unequal, the larger one much more massive than the legs but shorter than the 2nd and 3rd pairs of these: fingers rather short and stout, with the tip spooned.

Legs broad and compressed, especially as to the merus, which joint—like the arm of the chelipeds—usually has some squamiform markings: the last three joints have bristly edges and the dactylus is thorny.

The abdomen in both sexes consists of 7 separate segments, and in the male its base is as broad as the sternum between the last pair of legs.

An Indo-Pacific genus.

### 86. *Metopograpsus messor* (Forsk.) Edw.

*Cancer messor*, Forskal, Descrip. Anim. in itin. orient. p. 88. *Grapsus messor*, Milne Edwards, Hist. Nat. Crust. II. 88: Krauss, Sudafr. Crust. p. 43: Hoffmann in Pollen & Van Dam, Faun. Madag. Crust. p. 23: Sluiter, Tijds. Nederl. Ind. XL. 1881, p. 164. *Metopograpsus messor*, Milne Edwards, Ann. Sci. Nat., Zool., (3) XX. 1853, p. 165: Heller, SB. Ak. Wien, XLIII. 1861, p. 362, and Novara Crust. p. 44: A. Milne Edwards, Nouv. Archiv. du Mus. IV. 1868, p. 71: Kossmann, Reise roth. Meer., Crust. p. 57: Hilgendorf, MB. Ak. Berl. 1878, p. 808: Miers, Phil. Trans. 1879, p. 489, and Zool. H. M. S. Alert, pp. 184, 245, 518, 545, and Challenger Braohyura, p. 258: de Man, Notes Leyden Mus. II. 1880, p. 183, and Journ. Linn. Soc. Zool. XXII. 1887-1888, p. 144, pl. ix. fig. 11, and Archiv f. Naturges. LIII. 1888, i. p. 361, pl. xv. fig. 6, and in Weber's Zool. Ergebn. Niederl. Ost. Ind. II. p. 314:

Richters, in Mobius, Meeresf. Maurit. p. 156: Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, p. 190: Lenz & Richters, Abh. Senck. Nat. Ges. XII. 1881, p. 425: Mülley, Verh. Nat. Ges. Basel, VIII. p. 475: Ozorio, Journ. Sci. Nat. Lisb. XI. p. 227: Henderson, Trans. Linn. Soc., Zool., (2) V, 1893, p. 390: Ortmann, Zool. Jahrb., Syst., VII. 1893-94, p. 701: Whitelegge, Mem. Austral. Mus. III. 1897, p. 139: Nobili, Ann. Mus. Genov. (2) XX. 1899, p. 265.

*Grapsus Gaimardi*, Savigny, Descr. Egypt. Crust. pl. ii. fig. 3.

*Metopograpsus Eydouzi* and *intermedius*, Milne Edwards, Ann. Sci. Nat., Zool., (2) XX. 1853, p. 165 (sec. Kingsley, l.c.).

*Pachygrapsus æthiopicus*, Hilgendorf, in v. d. Decken, Reisen Ost-Afr., Crust. p. 88, pl. iv. fig. 2 (vide Kossmann, l.c., and Hilgendorf, l.c.).

Carapace about four-fifths as long as broad, the sides distinctly convergent posteriorly; besides the oblique markings on the lateral parts of the epibranchial regions, there are some fine transverse markings on the post-frontal region.

Front about three-fifths the greatest breadth of the carapace, its free edge beaded, thin and prominent but hardly laminar, and slightly sinuous. Orbits little oblique, their major diameter is a little more than a third the width of the front: the inner angle of the lower border is denticulate.

Chelipeds unequal, the length of the larger one about  $1\frac{1}{2}$  times that of the carapace: there are wrinkles or squamiform markings on the upper surface of the arm and wrist and—along with some vesiculous granules—on the upper and lower borders of the hand. The inner border of the ischium is denticulate, the inner border of the arm is spinate and is expanded distally to form a lacinate lobe, and there is a spine, which may be double, at the inner angle of the wrist: the fingers have blunt tips, and the dactylus is not very much longer than the upper border of the palm.

Of the legs the 1st pair is the smallest and the 3rd pair the longest—about twice the length of the carapace: in all, the upper border of the merus ends in a spine and the lobe at the far end of the lower border is spinate: in the last three pairs the greatest breadth of the merus is half its length.

The terminal segment of the male abdomen is simply triangular.

In the Indian Museum are 56 specimens, from Karachi, Bombay, the Orissa coast, the Ganges Delta, the Arakan coast, and the Andamans. The carapace of the largest specimen is  $23\frac{1}{2}$  millim. long and 30 millim. broad.

### 87. *Metopograpsus maculatus*, Edw.

*Metopograpsus maculatus*, Milne Edwards, Ann. Sci. Nat. Zool. (3) XX. 1853, p. 165: de Man, Journ. Linn. Soc., Zool., XXII. 1867-68, p. 145, pl. x. figs. 1-8.

Distinguished from the only other Indian species by the following characters :—

The carapace is much more elongate, its length being seven-eighths of its breadth, its sides are very markedly convergent posteriorly, and there are no transverse markings on the post-frontal region.

The front is nearly three-fourths the greatest breadth of the carapace, and its free edge is decidedly laminar and nearly straight.

The orbits are oblique : their major diameter is less than a third the breadth of the front and the inner angle of their lower border is not denticulate.

The fingers of the chelæ, though their tips are spooned, are not very blunt : the dactylus is much longer than the upper border of the palm.

Except perhaps in the last pair of legs, the meropodites are narrower, their greatest breadth being decidedly less than half their length.

In the male abdomen the terminal segment has a somewhat three-lobed appearance.

In the Indian Museum are two specimens from Mergui. It seems to me very doubtful whether they are distinct from *M. latifrons*, White (Jukes, Voy "Fly," II. 337, pl. ii. fig. 2).

#### PACHYGRAPSUS, Randall, Stimpson.

*Pachygrapsus*, Randall, Proc. Ac. Nat. Sci. Philad. 1889, p. 126 : Milne Edwards, Ann. Sci. Nat., Zool., (3) XX. 1863, p. 166 : Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 101 : Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, pp. 188, 198 : Miers, Challenger Brachyura, p. 259.

Differs from *Metopograpsus* only in the following particulars :—

(1) the tooth or lobe at the inner angle of the lower border of the orbit is small and does not fill the orbital hiatus, so that the antennæ are not excluded from the orbit ; (2) there may be a tooth or two on the lateral border of the carapace immediately behind the outer orbital angle.

*Distribution* : West Indies eastwards, through the Mediterranean, to the American Pacific coast.

#### 88. *Pachygrapsus minutus*, A. M. Edw.

*Pachygrapsus minutus*, A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 292, pl. xiv. fig. 2 : Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, p. 201 : de Man, Notes Leyden Mus. V. 1883, p. 158, and Archiv f. Naturges. LIII. 1887. i. p. 368, and Journ. Linn. Soc., Zool., XXII. 1888, p. 148 : Oano, Boll. Soc. Nat. Napol. III. 1889, p. 240.

Carapace a good deal broader than long, its whole dorsal surface marked with fine transverse and oblique lines : the lateral borders are

strongly convergent posteriorly, and have no spine behind the acute outer orbital angle.

Front about three-fifths the greatest breadth of the carapace, moderately deflexed, its free edge slightly sinuous. Orbits little oblique, their major diameter more than a third the breadth of the front, their lower border not denticulate.

The chelipeds in the male are subequal and vastly more massive than the legs, and are about twice the length of the carapace, and, except for some squamiform markings on the arm, are smooth: the inner border of the ischium and both borders of the arm are crenulate, and the distal end of the inner border of the arm is expanded to form a denticulate lobe: the inner angle of the wrist is dentiform: the fingers are stout and blunt.

Of the legs the two middle pairs are the longest, being not twice the length of the carapace. In all the last three joints are bristly, and the merus has a spine at the far end of the anterior border and two largish spines at the far end of the posterior border.

The terminal joint of the male abdomen is simply triangular.

A small species: the carapace of the single specimen (from Mergui) in the Indian Museum is 6.5 millim. long and 10 millim. broad.

### Subfamily VARUNINÆ.

#### VARUNA, Edw.

*Varuna*, Milne Edwards, Dict. Hist. Nat. XVI. p. 511 (1830), and Hist. Nat. Crust. II. 94, and Ann. Sci. Nat. Zool., (3) XX. 1853, p. 176: Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, pp. 188, 205: Miers, Challenger Brachyura, p. 265.

*Trichopus*, De Haan, Faun. Japon. Crust. p. 32.

Carapace very little broader than long, depressed, with thin sharp edges, the regions fairly well indicated. Front a little more than half the breadth of the anterior border and a little more than a third the greatest breadth of the carapace, straight, prominent, sublaminar, little deflexed. Antero-lateral borders of the carapace arched, cut into 3 teeth including the outer orbital angle.

Orbits small, of good depth, their lower border broken and incomplete. The antennules fold obliquely and the interantennular septum is broad. Antennæ of fair size, standing in the orbital hiatus.

Epistome of good length, well defined. Buccal cavern square. The external maxillipeds gape, but not very widely: their exognath is not nearly as broad as the ischium: their merus is shorter, but anteriorly much broader, than the ischium, its antero-external angle being considerably produced, so that the palp articulates near the middle of the anterior border.

Chelipeds equal, but variable in size. In old males they are considerably longer, and vastly more massive, than the legs: in the female they are shorter, and though stouter are not vastly stouter than the legs. The fingers, though sharp pointed, are a little hollow-tipped.

The legs have the three terminal joints compressed, dilated, and plumed, for swimming: the 2 middle pairs are the longest, the last pair is the shortest.

The abdomen in both sexes consists of 7 separate segments: in the male it does not completely cover the sternum between the last pair of legs.

*Distributed* throughout the Indo-Pacific, ascending estuaries even into freshwater. Commonly found at sea on drift logs.

### 89. *Varuna litterata* (Fabr.) Edw.

*Cancer litteratus*, Fabricius, Eat. Syst. Suppl. p. 342: Herbst, Krabben, III. i. 58, pl. xlviii. fig. 4.

*Grapsus litteratus*, Boec, Hist. Nat. Crust. I. p. 208, and Latreille, Hist. Nat. Crust. et Ins. VI. p. 71.

*Varuna litterata*, Milne Edwards, Diet. d'Hist. Nat. XVI. p. 511.

*Trichopus litteratus*, De Haan, Faun. Japon. Crust. p. 32: Dana, U. S. Expl. Exp. Crust. pt. I. p. 336, pl. xx. fig. 8.

*Varuna litterata*, Milne Edwards, Hist. Nat. Crust. II. p. 95, and Ann. Sci. Nat. Zool., (3) XX. 1853, p. 176: Lucas, Hist. Nat. Anim. Artic., Crust., p. 72, pl. iii. fig. 4: Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 103: Heller, Novara Crust. p. 51, A. Milne Edwards, Nouv. Archiv. du Mus. IV. 1868, p. 71, and IX. 1873, p. 295: Brocchi, Ann. Sci. Nat. (6) II. 1875, (*male appendages*): Miers, Cat. Crust. New Zealand, p. 40, and Ann. Mag. Nat. Hist. (5) V. 1880, p. 310, and Challenger Brachyura, p. 265: Tozzetti, Magenta Crust. p. 122, pl. viii. figs. 2 a-g: Hilgendorf, MB. Ak. Berl. 1878, p. 808: Neumann, Crust. Heidelb. Mus., p. 27: Nauck, Zeits. Wiss. Zool. XXXIV. 1880, p. 29 (*gastric teeth*): Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, p. 205: Sluiter, Tijds. Nederl. Ind. XL. 1881, p. 164: Haswell, Cat. Austral. Crust. p. 103: Filhol, Crust. Nouv. Zel. in Miss. l'île Campbell, p. 390: de Man, Archiv. fur Nat. LIII. 1887, i. p. 371, and in Weber's Zool. Ergebn. Niederl. Ost-Ind. II. 1892, p. 315, and Zool. Jahrb., Syst. IX. 1895, p. 112: Henderson, Trans. Zool. Soc. (2) V. 1893, p. 391: Ortmann, Zool. Jahrb. Syst., VII. 1893-94, p. 713: Max Weber, Zool. Jahrb. Syst. X. 1898, p. 157: Nobili, Ann. Mus. Genov. (2) XX. 1899, p. 267.

Carapace curiously pitted and frosted above, the regions well enough defined by grooves, which in places are broad shallow and uneven; the disposition of these grooves in the middle of the carapace makes a letter H. The borders of the carapace are thin and are sharply defined and finely beaded or milled: the antero-lateral borders are arched and are cut into three teeth, including the outer orbital angle: the postero-lateral boundary of the carapace, on each side, is a distinct facet.



The chelipeds vary, according to sex and age, from a little over once (in the female) to a little over twice (in old males) the length of the carapace. The borders of the arm are denticulated, especially the inner border; the inner angle of the wrist forms a large sharp spine with some spinules at its base; the inner surface of the palm is more or less granular, the outer surface has some fine reticulate markings and—running parallel with the lower border, on to the fixed finger—a raised line: the fingers are stout and strongly toothed, the dactylus being longer than the upper border of the palm.

The 2nd and 3rd pair of legs, which are about equal, are over  $1\frac{1}{2}$  times the length of the carapace: the 1st pair are a little more than a dactyl-length, the 4th pair a little less than a dactyl-length longer than the carapace. The only armature of the legs, which are typical swimming paddles, is a subterminal spine on the anterior border of the meropodite.

In the Indian Museum are 63 specimens from the seas of India. The carapace of the largest male is 50 millim. long and 56 millim. broad.

#### PTYCHOGNATHUS, Stimpson.

*Ptychognathus*, Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 104; Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, pp. 188, 208; de Man, Zool. Jahrb., Syst., IX. 1895, p. 90. *Gnathograpsus*, A. Milne Edwards, Nouv. Archiv. du Mus. IV. 1868, p. 180. *Calochirus*, Nauck, Zeits. Wiss. Zool. XXXIV. 1880, pp. 30, 66 (*teste* de Man).

Very closely resembles *Varuna*, from which it differs only in the following particulars:—

(1) the exopodite of the external maxillipeds is of remarkable breadth, being at least as broad as, and usually much broader than, the ischium of those appendages:

(2) the regions of the carapace are not always so well defined.

(3) the dactyli of the legs, though compressed, are not so broad.

*Distribution*: Islands of the Indo-Pacific, entering fresh water above any tidal influence.

#### *Key to the Indian species of Ptychognathus.*

1. Carapace hardly broader than long: front prominent, straight or hardly sinuous: the antennules fold very obliquely:—

1. Teeth of the antero-lateral border sharp and salient: regions of the carapace fairly well defined: fingers of the female chela nude:—

i. Inner angle of the wrist dentiform, but not produced: a large shaggy patch of hairs on the inner surface of the hand of the male... *P. dentatu*.

- ii. Inner angle of the wrist produced to form a long spine: a patch of hair on the outer surface of the hand of the male, near the finger cleft..... *P. onyx.*
  - 2. Teeth of the antero-lateral border not salient, inconspicuous: regions of the carapace not, or hardly, indicated:—
    - i. A subterminal patch of bristles on the outer surface of the fixed finger of the female..... *P. andamanica.*
    - ii. Fingers of female nude ..... *P. pusilla.*
- II. Carapace decidedly broader than long: front little prominent and decidedly sinuous: the antennules fold nearly transversely..... *P. barbata.*

90. *Ptychognathus dentata*, de Man.

*Ptychognathus dentatus*, de Man, in Weber's Zool. Ergebu. Niederl. Ost-Ind. II. 1892, p. 318, pl. xviii. fig. 9.

Carapace inappreciably broader than long, flat but not particularly depressed, its regions quite distinct, as also are the cervical and branchial grooves and a pair of post-frontal tubercles: on the posterior part of each epibranchial region, obliquely parallel with the postero-lateral borders, is a fine ridge.

Front prominent, laminar, nearly straight, its extent is two-fifths the greatest breadth of the carapace.

Antero-lateral borders of the carapace cut into three sharp salient teeth, of which the first is much the largest, and the third much the smallest.

Upper border of the orbit very sinuous. The antennules fold very obliquely. Anterior border of the buccal cavern not granular, but having a median horizontal tooth.

Exognath oval, with a smooth and strongly convex surface: its greatest breadth in the male is more than twice that of the ischiognath, but in the female is only a little more than that of the ischiognath.

Chelipeds of the male more than  $1\frac{1}{2}$  times the length of the carapace, smooth: inner angle of the wrist acute, but not spiniform: palm higher than long, inflated at the postero-inferior angle, and having a tussock of hairs in the middle of its inner surface: dactylus more than twice the length of the upper border of the palm, longer slenderer and less strongly toothed than the fixed finger: both fingers though hollowed at the tip are sharp-pointed. In the female the chelipeds are about as long as the carapace; the inner angle of the wrist is spiniform; the palm is not swollen and is nude, and its outer surface is traversed, near the lower border, by a fine raised line which extends nearly to the tip of the fixed finger.

The 2nd and 3rd pairs of legs are about  $1\frac{1}{2}$  times, the 1st pair are not quite  $1\frac{1}{2}$  times, and the 4th pair are not  $1\frac{1}{2}$  times, the length of the carapace: on the anterior border of the merus of the first three pairs is a subterminal spine.

The sidewall of the carapace and the basal joints of the legs have little tomentum.

In the Indian Museum are 2 males and an egg-laden female from "the Bay of Bengal" and 2 young females from Upper Tenasserim.

The carapace of the largest male is 19 millim. long and not quite 20 millim. in its greatest breadth.

91. *Ptychognathus onyx*, n. sp.

Very closely related to *P. spinicarpus*, Ortm., and to *P. Polleni* and *affinis*, de M., if these species are distinct.

This species very nearly resembles *P. dentata*, from which it differs, young males being compared with females of the same size, only in the following particulars:—

(1) the carapace though otherwise similar is much thinner and more depressed and its markings are not quite so distinct:

(2) in the middle of the anterior border of the buccal cavern is a slight prominence, but no distinct tooth:

(3) the exognath (in the young male) is, as in the female of *P. dentata*, but little broader than the ischiognath:

(4) in the chelipeds of the young male the inner angle of the wrist is produced to form a long spine; there is no hair on the inner surface of the palm, but on the outer surface, in the finger-cleft and extending along the fixed finger, there is a tuft of hair; the outer surface of the palm also, as in the female of *P. dentata*, is traversed, close to the lower border, by a raised line, which runs to the tip of the fixed finger; finally the fingers are blunter, and the dactylus is only about twice as long as the upper border of the palm.

Practically the chief distinction between this species and *P. dentata* is that in the male of this species the inner angle of the wrist forms a long spine, and the hair is on the outside instead of on the inside of the hand.

In the Indian Museum are two young males probably from Tavoy. The carapace is a little over 12 millim. long and 13 millim. broad.

92. *Ptychognathus andamanica*, n. sp.

Closely related to *P. pusilla*, of which it may be an Andaman variety.

Carapace not much broader than long, quite flat, much depressed, the regions are hardly indicated, even when the carapace is quite dry.

but the H-shaped mark in the middle is always plainly visible, the whole surface is closely and finely punctate: there are no post-frontal tubercles, but on the posterior part of either epibranchial region there is a fine line running obliquely-parallel with the postero-lateral borders.

Front prominent, laminar, slightly sinuous, its extent is two-fifths the greatest breadth of the carapace.

The antero-lateral borders are cut into 3 not very acute or distinct lobes (including the outer orbital angle), of which the first is much the largest, and the last much the smallest.

Upper border of the orbit slightly sinuous: the antennules fold very obliquely. The anterior border of the buccal cavern is granular and a little concave.

The exognath is long and elliptical; its breadth in the female, is nearly twice that of the ischiognath.

The chelipeds in the female (male unknown) are about as long as the carapace, and their outer surface is very finely reticulate-granular: inner angle of wrist pronounced, but not spiniform: palm without hair, but there is a characteristic brush of stiffish hair at the tip of the fixed finger on its outer surface. The fingers have broad tips, especially the fixed finger, which is stouter and more strongly toothed than the dactylus: the dactylus is about twice as long as the upper border of the palm: the outer surface of the palm and fixed finger is traversed, near the lower border, by a fine raised granular line.

The legs have not much tomentum on the basal joints, but the anterior border of the meropodites is rather thickly fringed: the subterminal denticle on the anterior border of the meropodites is small, blunt, inconspicuous, or obsolescent. The 2nd and 3rd pair of legs, which are the longest, are about  $1\frac{1}{2}$  times, the 1st pair are not  $1\frac{1}{2}$  times, and the 4th pair are little more than once, the length of the carapace.

In the Indian Museum are two young females from a freshwater stream at the base of Saddle Hill in North Andaman Island. Their colour is dark mottled green. The carapace is a little over 13 millim. long and about 14 millim. broad.

### 93. *Ptychognathus pusilla*, Heller.

*Ptychognathus pusillus*, Heller, Novara Crust. p. 60: Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, p. 204: de Man, Notes Leyden Mus. V. 1883, p. 161, and Zool. Jahrb. Syst. IV. 1888-89, p. 440, and in Weber's, Zool. Ergebn. Niederl. Ost. Ind. II. p. 325, and Zool. Jahrb. Syst. IX. 1895, p. 99, and X. 1898, pl. xxviii. fig. 22: Ortmann, Zool. Jahrb., Syst. VII. 1893-94, p. 712.

This species, which was first found in the Nicobar Islands, is not represented in the Museum collection and I have never seen it.

94. *Ptychognathus barbata* (A. M. Edw.).

*Gnathograpsus barbatus*, A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 316, pl. xvii. fig. 4.

*Ptychognathus barbatus*, Ortmann, Zool. Jahrb. Syst. VII, 1893-94, p. 712; de Man, Zool. Jahrb., Syst., IX. 1895, p. 105.

Carapace decidedly broader than long, flat, depressed, the regions indistinct: the two postfrontal tubercles are fairly distinct, but there is no distinct raised line on the posterior part of the epibranchial regions, running obliquely parallel with the posterior borders, such as is present in all the other Indian species. There is a good deal of tomentum on the sides of the carapace.

Front decidedly sinuous, not prominent, its extent is a little more than two-fifths the greatest breadth of the carapace.

The antero-lateral borders of the carapace are cut into 3 not very conspicuous teeth (including the outer orbital angle) of which the first is much the largest and the third much the smallest, as usual.

Upper border of the orbit little sinuous: the antennules fold nearly transversely. Anterior border of the buccal cavern finely granular.

The exognath is elliptical, with a slightly convex surface: in the male its greatest breadth is more than that of the ischiognath, in the female it is slightly narrower than in the male.

Chelipeds in the male about  $1\frac{1}{2}$  times the length of the carapace, the inner angle of the wrist little pronounced; the hand massive, with a tuft of hair in the finger-cleft and running some little distance along the outer surface of both fingers; the fingers are rather blunt, the dactylus, which is about twice the length of the upper border of the palm is longer slenderer and less strongly toothed than the fixed finger, against which it closes rather obliquely. In the female the chelipeds are about as long as the carapace and are not very massive, the inner angle of the wrist is dentiform, there is no hair on the hand or fingers, and the outer surface of the hand and fixed finger is traversed near the lower border by a raised line.

The leg-joints are less expanded and less abundantly plumed than in the other Indian species, and there is no subterminal spine on the anterior border of the meropodites. The 2nd and 3rd pairs of legs are about  $1\frac{1}{2}$  times, the 1st pair about  $1\frac{1}{4}$  times, and the last pair a little over once, the length of the carapace.

In the Indian Museum are 3 specimens from Diamond Island off the Pegu coast and from Akyab, (besides numerous specimens from Samoa). The carapace of an apparently adult male is 11 millim. long and 14 millim. broad.

## PYXIDOGNATHUS, A. M. Edw.

*Pyxidognathus*, A. Milne Edwards, Bull. Soc. Philom. Paris (7) III. 1878, p. 109; de Man, Notes Leyden Mus. V. 1883, p. 160, and Journ. Linn. Soc., Zool., XXII. 1888, p. 148.

*Hypsilograpsus*, de Man, Notes Leyden Mus. I. 1879, p. 72 (*ipso teste*).

This genus is closely related to *Varuna* and *Ptychognathus*. It differs from *Varuna* in the same particulars that *Ptychognathus* does, that is to say, the exognath of the external maxillipeds is much broader than the ischiognath, and the dactyli of the legs though compressed are not dilated. It further differs, both from *Varuna* and *Ptychognathus* in the following characters:—

(1) the carapace is decidedly transverse, is deep, and is dorsally strongly convex in both directions: it is also anteriorly declivous with the front deflexed, and its antero-lateral borders are hardly arched:

(2) the antennules fold transversely:

(3) the lower border of the orbit is complete, except of course at the orbital hiatus:

(4) the carpopodites and propodites of the legs are not particularly broad.

*Distribution*: Indo-Pacific in fresh or brackish water.

*Key to the Indian species of Pyxidognathus.*

- I. A single spine on the posterior border of the meropodites of the legs ..... *P. fluviatilis*.
- II. More than one spine on the posterior border of the meropodites of the legs ..... *P. deianira*.

95. *Pyxidognathus deianira*, de Man.

*Pyxidognathus deianira*, de Man, Journ. Linn. Soc., Zool., XXII. 1888, p. 148, pl. x. figs. 4-6.

Carapace about  $\frac{3}{4}$  as long as broad, convex, smooth, without distinction of regions excepting a faintish H-shaped mark in the middle. Free edge of front sinuous or four-lobed, as in the next species.

Antero-lateral borders of the carapace cut into three prominent acute teeth (including the outer orbital angle), the first of which is the largest, and the last of which is spine-like.

Upper border of orbit slightly sinuous, lower border finely denticulate.

Exognath of the external maxillipeds, in the male, very much broader than the ischiognath, and having a smooth convex surface.

Chelipeds in the young male about  $1\frac{1}{2}$  times the length of the carapace: inner border of ischium, arm, and wrist denticulate; inner angle of

wrist spiniform; the upper border of the palm is granulate, a finely beaded raised line traverses the lower part of the outer surface of the palm and fixed finger, and there is a very short series of granules near the middle of the inner surface of the palm: the palm is nearly as high as long, and the dactylus is much longer than the upper border of the palm and closes against the fixed finger by the tip only.

The 2nd pair of legs, which are the longest, are not much short of twice the length of the carapace; the 4th pair, which are the shortest, are but little longer than the carapace. In all the legs, the meropodite has some fine rugosities on its upper surface, a spine near the far end of the anterior border, and some spines on the posterior border—these being most numerous in the case of the 4th pair of legs: and in all, the edges of the 3 terminal joints are hairy but not plumose, nor are these joints broadened or compressed.

In the Indian Museum are two very small male specimens from Mergui.

96. *Pyxidognathus fluviatilis*, n. sp.

Carapace transverse, markedly convex, finely punctate, the regions indicated only by an H-shaped mark in its centre.

Front between two-fifths and a third the greatest breadth of the carapace, deflexed, sinuous or four-lobed, the two middle lobes broad, the outer lobes (= inner orbital angles) subacute.

Antero-lateral borders of the carapace slightly arched, cut into three prominent acute teeth (including the outer orbital angle) of which the first is the largest and least acute, and the third is spine-like.

Orbits of good depth, the upper border slightly sinuous, the lower border defined by a granular ridge running close behind the prominent denticulated ridge that bounds the infra-orbital region of the carapace.

Anterior border of buccal cavern prominent, finely crenulate. Exognath in the female broader than the ischiognath, and having a smooth convex surface.

Chelipeds in the female about as long as the carapace, more massive than the legs: inner angle of wrist acuminate: a raised line runs along the outer surface of the palm and fixed finger, close to the lower border: fingers rather sharp though spooned at tip, dactylus hardly twice the length of the upper border of the palm, longer and rather less strongly toothed than the fixed finger.

All the leg-joints are plumed, and all the dactyli are long compressed and recurved. In all the legs there is a very strong spine in the distal

half of the posterior border of the meropodite, and in the first 3 pairs there is a smaller subterminal spine on the anterior border of the same joint. The 2nd and 3rd pairs of legs are about  $1\frac{3}{4}$  times, the 1st pair are not quite  $1\frac{1}{2}$  times, and the 4th pair are about  $1\frac{1}{4}$  times the length of the carapace.

Colour mottled dark green. A single female was found clinging to the floats of a fisherman's net in the R. Ichamutty above Bongong in the Jessore District: its carapace is 15 millim. long and 19 millim. broad.

The legs are obviously adapted for swimming, and the recurved dactyli and spiny meropodites appear to be adaptations to a swift current.

The chief difference between this species and *P. deianira*—the female of the former being compared with the male of the latter—is that in this species the three terminal joints of the legs are more compressed and the posterior border of the meropodites is armed with a single spine.

#### Sub-family SESARMINÆ, Dana.

##### SESARMA, Say.

*Sesarina*, Say, Journ. Acad. Nat. Sci. Philad. I. 1817, p. 76: Milne Edwards, Hist. Nat. Crust. II. 71, and Ann. Sci. Nat. Zool. (3) XX. 1853, p. 181: A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 301: Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, p. 213: Miers, Challenger Brachyura, p. 269: de Man, Zool. Jahrb., Syst., II. 1886-87, p. 641 and IX. 1895-97, p. 128: Bürger, Zool. Jahrb., Syst., VII. 1893-94, p. 613.

*Pachysoma*, De Haan, Faun. Japon. Crust., p. 33.

*Holometopus*, Milne Edwards, Ann. Sci. Nat. Zool. (3) XX. 1853, p. 187.

Carapace squarish or actually square (the sides being straight and usually nearly parallel), usually deep (though occasionally shallow and much depressed), seldom very convex: the gastric region is almost always very well delimited, and is commonly divided into 5 subregions, and in most cases the 4 antero-lateral subregions project as 4 prominent post-frontal tubercles.

The side-walls of the carapace have everywhere a characteristic fine-meshed reticulate texture as regular as that of a sieve. This appearance is due to a multitude of small uniform granules arranged in pairs in close-set parallel rows: between each pair of granules is a little row of bristles, one of which in each row is long and points diagonally forwards.

The front occupies half, or more, of the anterior border of the carapace, and is obliquely or vertically deflexed.



The orbits, which occupy the rest of the anterior border of the carapace, are oval and of good depth: below their outer angle is a deepish gap leading into a system of grooves which open into a notch at the antero-lateral angle of the buccal cavern. At the inner angle of the orbit is the usual tooth, belonging to the inner of the two fossæ into which (as in all the crabs of this subfamily) the orbit is so plainly divided. The eyes are of no great length.

The antennules fold nearly transversely into rather narrow fossæ: the inter-antennular septum is very broad.

The antero-external angle of the 2nd joint of the antennal peduncle is a good deal produced: the antennal flagellum, which is slender and rather short, lies in the orbital hiatus.

Epistome well defined, prominent, rather short fore and aft. Buccal cavern square. The external maxillipeds leave between them a large rhomboidal gap, which is a good deal filled up by a hairy fringe: they are obliquely traversed, from a point behind the antero-external angle of the ischium to the antero-internal angle of the merus, by a conspicuous line or crest of hairs: the palp, which is rather coarse, is attached to the rounded summit of the obliquely-directed merus.

Chelipeds massive—not always so in the female—usually subequal, of no great length: palm high and short, the fingers though subacute, are hollowed at the tip.

The legs do not usually differ very markedly in length, though the third pair are the longest and the first and last (4th) pairs the shortest: the meropodites are thin, and are usually, but not always, broad.

The abdomen in both sexes consists of 7 separate segments: in the male it occupies the whole breadth of the sternum between the bases of the last pair of legs. In both sexes the second segment, as well as the exposed portion of the first, are narrow fore and aft. In the female the last segment is small and narrow from side to side, and is more or less impacted in the broad 6th segment: in the male also the last segment is much narrower than the one that precedes it.

*Distribution*: all tropical and subtropical seas: not found in the Mediterranean.

I am not inclined to adopt the subgenera proposed by Dr. de Man, although I must admit that his system is convenient in practice, for identifying species.

I may also mention here that specific distinctions based merely on the sculpture of the dactylus of the male chelæ are inadmissible, as the sculpturing frequently differs in the two fingers of the same individual.

*Key to the Indian species of Sesarma.*

- I. Carapace deepish, its length decidedly less than its breadth between the antero-lateral angles, its sides nearly parallel—never markedly divergent posteriorly:—

1. The inner border of the arm bears, near its far end, a large acute tooth: on the upper surface of the palm of the male are at least two characteristic oblique comb-like ridges: the upper surface of the movable finger of the male is milled:—

- i. Posterior border of the meropodites of the legs entire:—

- a. No tooth on the lateral border of the carapace behind the orbital angle:—

- a. Front more than half the extent of the anterior border of the carapace..... *S. quadratum.*

- β. Front exactly half the extent of the anterior border of the carapace..... *S. pictum.*

- b. A tooth on the lateral border of the carapace, behind the orbital angle ..... *S. bidens.*

- ii. Distal end of the posterior border of the meropodites of the legs acutely serrate (no tooth behind the outer orbital angle)... . *S. Andersoni.*

2. The inner border of the arm does not end in a large spine or acute lobe, though it may be a little dilated distally: there are no oblique pectinated ridges on the upper surface of the palm, and the upper surface of the movable finger of the male though it may be granular is not milled:—

- i. A tooth at the inner angle of the wrist (a tooth on the lateral border of the carapace behind the orbital angle):—

- a. The breadth of the carapace between the antero-lateral angles is equal to, or more than, the breadth between the epibranchial teeth..... *S. Edwardsi.*

- b. The breadth of the carapace between the antero-lateral angles is decidedly less than the breadth between the epibranchial teeth, the sides of the carapace being markedly sinuous..... *S. Meinerti.*

- ii. No spine at the inner angle of the wrist:—

- a. Carapace and appendages not uniformly tomentose: two acute teeth—the second of which is hardly visible—on the lateral border, behind the acute orbital angle..... *S. intermedium.*

- b. Carapace and appendages covered with a short but very dense fur, amid which are prominent tubercle-like tufts of hair: lateral borders cut into three blunt lobes (including the orbital angle) of equal size..... *S. lanatum*.
- II. Carapace nearly square, its length being little less than its breadth between the antero-lateral angles: the inner border of the arm ends in an acute serrated lobe: a very finely pectinated ridge traverses the upper surface of the palm, fore and aft, close to the upper border: (a tooth on the lateral border of the carapace behind the orbital angle):—
1. Carapace deep, its sides nearly parallel: a transverse granular ridge on the inner surface of the palm: dactyli of the legs of good length:—
    - i. Upper border of movable finger of male with an elegantly milled crest of 40 to 60 fine lamellæ..... *S. tæniolatum*
    - ii. Upper border of movable finger of male with a coarsely crenulate crest..... *S. tetragonum*.
  2. Carapace shallow and depressed, its sides divergent posteriorly: no transverse granular crest on the inner surface of the palm: dactyli of the legs short: (a milled crest of about 25 very fine lamellæ on the upper border of the movable finger of the male)..... *S. Brockii*.
- III. Carapace somewhat elongate (its length being decidedly more than its breadth at the antero-lateral angles), shallow and depressed:—
1. No tooth on the lateral border of the carapace behind the orbital angle: legs with remarkably broad meropodite and remarkably short propodite: upper border of movable finger of male with an elegantly milled crest of about 40 fine lamellæ ..... *S. latifemur*.
  2. Two teeth on the lateral border behind the orbital angle: movable finger without any milling:—
    - i. Post-frontal tubercles of the gastric region serrated: legs with meropodites of good breadth and dactyli of good length..... *S. politum*.
    - ii. Post-frontal tubercles smooth: legs with rather narrow meropodites and short dactyli..... *S. oceanicum*.
- IV. The length of the carapace is just equal to its breadth at the antero-lateral angles: legs long and slender, with elongate dactyli:—
1. Carapace shallow, depressed, perfectly square, its sides quite parallel: two little teeth on the lateral border behind the orbital angle..... *S. Finni*.
  2. Carapace deepish, its sides strongly divergent posteriorly where its breadth is much greater than its length: two teeth (not including the orbital angle)

on the lateral border, the posterior one being very small :—

- i. Third pair of legs not three times the length of the carapace..... *S. longipes*.
- ii. Third pair of legs more than three-and-a-half times the length of the carapace..... *S. kraussi*.

### 97. *Sesarma quadratum* (Fabr.).

*Cancer quadratus*, Fabricius, Ent. Syst. Suppl. p. 341.

*Ocypoda quadrata*, Bosc, Hist. Nat. Crust. I. p. 198.

*Ocypoda plicata*, Latreille, Hist. Nat. Crust. &c. VI. p. 47.

*Sesarma quadrata*, Milne Edwards, Hist. Nat. Crust. II. 75, and Ann. Sci. Nat., Zool., (3) XX. 1853, p. 183.

*Sesarma quadratum*, A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 302 : Miers, Phil. Trans. Vol. 168, 1879, p. 490.

*Sesarma quadrata*, Richters, in Mobius' Meeresf. Maurit. p. 157 : Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, p. 217 : Lenz and Richters, Abh. Senck. Nat. Ges. XII. 188, p. 425 : de Man, Zool. Jahrb. Syst. II. 1887, p. 655, pl. xviii. fig. 2 and p. 683, and IV. 1889, p. 434, and IX. 1895-97, pp. 181, 182, and Notes Leyden Mus. XII. 1890, p. 99, and in Weber's Zool. Ergebn. Niederl. Ost-Ind. II. p. 328 : Thallwitz, Abh. Mus. Dresden, 1890-91, No. 3, p. 37 : Henderson, Trans. Linn. Soc. Zool., (2) V. 1893, p. 392 : Ortmann, Zool. Jahrb. Syst. VII. 1893-94, p. 724.

*Grapsus (Pachysoma) affinis*, De Haan, Faun. Jap. p. 66, pl. xviii. fig. 5.

*Sesarma affinis*, Krauss, Sudafr. Crust. p. 45 : Milne Edwards, Ann. Sci. Nat. Zool. (3) XX., 1853, p. 183 : Heller, Novara Crust. p. 62 : de Man, Notes Leyden Mus. II. 1880, p. 22 : Miers, Ann. Mag. Nat. Hist. (5) V. 1880, p. 312 : Kingsley, *l.c. supra*, p. 213 : Ortmann, *l.c. supra*, p. 724.

*Sesarma unguolata* : Milne Edwards, Ann. Sci. Nat., Zool. (3) XX. 1853, p. 184 : Kingsley, *l.c. supra*, p. 213.

*Sesarma aspera*, Heller, Novara Crust. p. 63, pl. vi. fig. 1 : Kingsley, *l.c. supra*, p. 214 : Müller, Verh. Nat. Ges. Basel, 1886, p. 476 : de Man, Zool. Jahrb. II. 1887, p. 656 and Journ. Linn. Soc. Zool. XXII. 1887-88, p. 169.

*Sesarma melissa*, de Man, Zool. Jahrb. Syst., II. 1887, p. 656, and Journ. Linn. Soc., Zool., XXII. 1888, p. 170, pl. xii. figs. 5-7, and Zool. Jahrb. Syst., IV. 1889, p. 434.

Carapace hardly convex, decidedly broader than long, its length being about four-fifths its breadth between the antero-lateral angles, deep ; the 4 post-frontal lobes prominent equal and a little rugose transversely, the rugæ being sparsely tufted with hair ; the cardiac and intestinal regions very much less distinct than the gastric : some oblique striations on the epibranchial regions

Front decidedly more than half the greatest breadth of the carapace, not very deep, its free margin usually but slightly sinuous. Lateral borders of carapace nearly parallel, a little divergent anteriorly, without any tooth behind the acute orbital angle.

The chelipeds differ in the sexes, being about  $1\frac{1}{4}$  times the length

of the carapace in the male and much more massive than the legs, but in the female hardly  $1\frac{1}{2}$  times the length of the carapace and not more massive than the legs. In both sexes the outer surface of the arm wrist and palm are granular, the granules on the arm and wrist having a squamiform arrangement, the inner border of the arm bears a subterminal spine of large size, the upper border of the arm ending in a much smaller spine, the inner angle of the wrist is not dentiform, and the inner surface of the palm is more or less granular. In the male the palm is a little swollen below and has, on its upper surface, some short oblique crests, of which two are most elegantly pectinated: in the female the palm is not swollen and the crests are simply granular. The dactylus is less than twice the length of the upper border of the hand (palm) and its dorsal surface is elegantly milled with from 11 to 19 blunt, rather coarse, transverse lamellæ: in the female this milling is incomplete and very indistinct. In neither sex is there any great gap between the closed fingers.

The meropodites of the legs are foliaceous, their greatest breadth in the 2nd and 3rd pairs being more than half their length, their anterior border ends at an acute subterminal spine, and their dorsal surface has some fine transverse squamiform sculpture. The anterior border of the last three joints of the legs, and part of the posterior border of the last two, is fringed with tufts of bristles. The 3rd pair of legs, which are slightly the longest, are about twice the length of the carapace, and their dactylus is about three-fourths the length of their propodite.

In the Indian Museum are 42 specimens from both coasts of the Peninsula, Ceylon, the Audamans and the Nicobars.

In a male of good size the carapace is 16 millim. long and 20 millim. broad.

#### 98. *Sesarina pictum*, De Haan.

*Grapus (Pachysoma) pictus*, De Haan, Faun. Japon. Crust. p. 61, pl. xvi. fig. 6.

*Sesarina picta*, Krauss, Sudafr. Crust. p. 45: Milne Edwards, Ann. Sci. Nat., Zool., (3) XX. 1853, p. 184: Stimpson, Proc. Ac. Nat. Sci. Philad. 1859, p. 106: de Man, Notes Leyden Mus. II. 1880, p. 22, and Zool. Jahrb., Syst., II. 1887, p. 657, and IX. 1895-97, pp. 181, 182, and Journ. Linn. Soc., Zool., XXI. 1888, p. 171: Bürger, Zool. Jahrb., Syst., VII. 1893-94, p. 626: Ortmann, Zool. Jahrb., Syst., VII. 1893-94, p. 725.

Agrees with *S. quadratum* in everything but the following particulars:—

(1) the carapace is not so broad, its length being about five-sixths of its breadth between the antero-lateral angles:

(2) the front is not so broad, its extent being only half the breadth of the carapace :

(3) the meropodites of the legs are not so broadly foliaceous, their greatest breadth, in the middle two pairs, being less than half their length.

The Indian Museum possesses a single specimen from Mergui.

### 99. *Sesarma bidens* (De Haan).

*Grapsus* (*Pachysoma*) *bidens*, De Haan, Faun. Japon. Crust. p. 60, pl. xvi. fig. 4, and pl. xi. fig. 4.

*Sesarma bidens*, Dana, U. S. Expl. Exp. Crust. pt. I. p. 353 : Milne Edwards, Ann. Sci. Nat., Zool., (3) XX. 1853, p. 185 : Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 105 : Heller, Novara Crust. p. 64 : Hilgendorf, in v. d. Decken's Reisen Ost-Afr., Crust., p. 91, pl. iii. fig. 3a : Hoffmann, in Pollen & Van Dam, Faun. Madag. Crust. p. 24 : Miers, Ann. Mag. Nat. Hist. (5) V. 1880, p. 313, and Zool. H. M. S. Alert, pp. 184, 246 : Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, p. 214 : de Man, Notes Leyden Mus. II. 1880, p. 28, and Zool. Jahrb., Syst., II. 1887, p. 658, and in Weber's Zool. Ergebn. Niederl. Ost-Ind. II. p. 330 : Lenz & Richters, Abb. Senck. Nat. Ges. XII. 1881, p. 425 : Bürger, Zool. Jahrb., Syst., VII. 1893-94, p. 628 : Ortmann, *ibid.* p. 726 : Nobili, Ann. Mus. Genova (2) XX. 1899, p. 269.

*Sesarma Dussumieri*, Milne Edwards, *l. c. supra* : Tozzetti "Magenta" Crust. p. 145, pl. ix. figs. 3 a-f : Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, p. 215 : de Man, Zool. Jahrb. Syst. II. 1887, p. 659, and IX. 1895-97, p. 208, and Journ. Linn. Soc., Zool., XXII. 1888, p. 177, pl. xii. figs. 8-12 : Ortmann, Zool. Jahrb., Syst., VII. 1893-94, p. 726.

*Sesarma lividum*, A. Milne Edwards, Nouv. Archiv. du Mus., V. 1869, Bull. p. 25, and IX. 1873, p. 303, pl. xvi. fig. 2 : Brocchi, Ann. Sci. Nat., Zool., (6) II. 1875, Art. 2, p. 83 (*male appendages*) : Kingsley, *tom. cit. supra*, p. 216 : de Man, Archiv. f. Naturges. LI. 1887, i. p. 381, pl. xvii. fig. 1, and Zool. Jahrb. Syst. II. 1887, p. 659, and Journ. Linn. Soc., Zool., XXII. 1888, p. 180.

*Sesarma Haswelli*, de Man, Zool. Jahrb., Syst., II. 1887, p. 658, and Journ. Linn. Soc., Zool., XXII. 1888, p. 175.

This species very closely resembles *S. quadratum*, from which it differs in the following characters:—

(1) there is a small sharp tooth on the lateral border of the carapace, immediately behind the outer orbital angle :

(2) the carapace is slightly less transverse (though decidedly broader than long) :

(3) the transverse ridges on the upper surface of the dactylus of the male chelæ are coarser and shorter and more tubercle-like.

In the Indian Museum are 52 specimens from the coasts of the Bay of Bengal, Andamans, Nicobars and Ceylon.

100. *Sesarma Edwardsi*, de Man.

*Sesarma Edwardsi*, de Man, Zool. Jahrb., Syst., II. 1887, p. 649, and Journ. Linn. Soc., Zool., XXII. 1888, p. 185, pl. xiii. figs. 1-4: Ortmann, Zool. Jahrb., Syst., VII. 1893-94, p. 721.

Differs from *S. quadratum* in the following particulars:—

(1) the carapace is squarer and less transverse, and the four post-frontal lobes of the gastric region are more prominent; the front also is slightly, but distinctly, broader:

(3) there is a sharp tooth on the lateral border of the carapace immediately behind the antero-lateral angle:

(3) the upper border of the arm does not end in a spine, and though there may be a slight subterminal dilatation of the crenulated inner border of the arm there is no large spine:

(4) there is a sharp tooth or spine just below the inner angle of the wrist:

(5) the upper surface of the wrist and outer surface of the palm are covered—usually very closely covered—with vesiculous tubercles; and there are smaller and sharper tubercles on the upper surface of the dactylus and the lower surface of the fixed finger of the chelæ:

(6) there are no oblique pectinated crests on the palm:

(7) the male abdomen is singularly broad.

In the Indian Museum are 126 specimens, most of which came from the Burma coast from Arakan to Tavoy, the rest from the Gangetic delta, the Andamans and Ceylon.

In the variety separated by de Man as *crassimana* the abdomen is not quite so broad as it is in the typical form, and the palm of the male is larger and more swollen.

101. *Sesarma intermedium* (De Haan).

*Grapsus (Pachysoma) intermedium*, De Haan, Faun. Japon. Crust. p. 61, pl. xvi. fig. 5.

*Sesarma intermedia*, Milne Edwards, Ann. Sci. Nat., Zool., (3) XX. 1853, p. 186: Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 105: Heller, Novara Crust. p. 64: Kingley, Proc. Ac. Nat. Sci. Philad. 1880, p. 216: Miers, Ann. Mag. Nat. Hist. (5) V. 1880, p. 314: de Man, Notes Leyden Mus. II. 1880, p. 25, and Zool. Jahrb., Syst., II. 1887, p. 649, and Journ. Linn. Soc., Zool., XXII. 1888, p. 182: Ortmann, Zool. Jahrb. Syst. VII. 1893-94, p. 721.

Differs from *S. quadratum* in the following particulars:—

(1) the carapace is more quadrate and less transverse, the post-frontal lobes are less prominent and much smoother, and the front is broader:

(2) there is a tooth—and sometimes also a second rudimentary tooth—on the lateral border immediately behind the orbital angle:

(3) there is no large subterminal spine on the inner border of the arm, nor does the upper border end in a spine :

(4) in the corner of the upper surface of the palm there are in the male some oblique granular lines, but no pectinated crests ; and on the inner surface of the palm there is a conspicuous transverse granular crest :

(5) the upper surface of the dactylus of the male chelæ is granular in its proximal half, but is not milled with transverse lamellæ.

From *S. Edwardsi* it is distinguished by numerous characters, but the absence of a spine at the inner angle of the wrist is sufficiently characteristic.

In the Indian Museum are 5 specimens from Mergui.

#### 102. *Sesarma Meinerti*, de Man.

*Sesarma Meinerti*, de Man, Zool. Jahrb., Syst., II. 1887, pp. 648, 668, and IX. 1895-97, p. 166 : Bürger, Zool. Jahrb. Syst. VII. 1893-94, p. 617, and Ortmann, *ibid.* p. 720.

*Sesarma tetragona*, Edw. (*nec* Fabr.), Milne Edwards, Hist. Nat. Crust. II. 73, and Ann. Sci. Nat., Zool., (3) XX. 1853, p. 184 : A. Milne Edwards, Nouv. Archiv. du Mus. IV. 1868, p. 71, and IX. 1873, p. 304, pl. xvi. fig. 4 : Hilgendorf, in v. d. Decken's Reisen Ost-Afr., Crust. p. 90 : Hoffmann, in Pollen & Van Dam, Faun. Madag. Crust. p. 23 : Hilgendorf, MB. Ak. Berl. 1878, p. 809 : Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, p. 218.

Carapace convex, especially fore and aft, a little broader than long, deep : the 4 post-frontal lobes prominent, unequal—the outer ones being much narrower than the middle pair ; the cardiac and intestinal regions are quite distinct, and the usual oblique striations are found on the epibranchial regions : the whole dorsal surface of the carapace is rather profusely covered with tufts of hair.

Front decidedly more than half the greatest breadth of the carapace, which is just behind the orbital angles, not very deep, its free edge sinuous. Lateral borders of the carapace somewhat sinuous, armed with a large tooth behind the orbital angle : there may even be a trace of a second epibranchial tooth.

Chelipeds subequal, almost equally massive in both sexes, about twice as long as the carapace. The outer surface of the arm and wrist is finely rugose, that of the palm is only pitted : neither the upper nor the inner border of the arm end in a tooth : inner angle of wrist pronounced but not dentiform : no pectinated crests of any kind on the palm : the fingers are a good deal arched and meet only at tip, the upper surface of the dactylus in the male has a row of inconspicuous denticles : on the inner surface of the palm there is an oblique granular crest.



The meropodites of the legs are foliaceous, but their breadth is not twice their length; but otherwise the legs are as in *S. quadratum*.

The abdomen of the male is decidedly narrow.

In the Indian Museum are 26 specimens from the Andamans and one from Madras. The carapace of a large one is 33 millim. long and 38 millim. broad: in the female the carapace is not so broad.

### 103. *Sesarma Andersoni*, de Man.

*Sesarma Andersoni*, de Man, Zool. Jahrb., Syst., II. 1887, p. 657, and Journ. Linn. Soc. Zool. XXII. 1888, p. 172, pl. xii. figs. 1-4.

Carapace moderately deep, hardly convex, considerably broader than long, the four post-frontal lobes of the gastric region only moderately prominent, nearly equal, pitted; the cardiac and intestinal regions faintly indicated; the oblique striations of the epibranchial regions very sharp and distinct, one of them almost projects beyond the lateral border as a tooth behind the orbital angle.

Front more than half the greatest breadth of the carapace, not very deep, its free margin a little convex but nearly straight. The lateral borders of the carapace are slightly convergent posteriorly: except for the afore-mentioned projection of the first branchial ridge there is no tooth behind the orbital angle.

Chelipeds much larger in the male than in the female, but the difference is not so marked as in *S. quadratum*. The inner border of the arm ends in a very acute denticulated lobe: the palm is traversed on the outer surface, near the lower border, by a fine raised line, and on the upper surface in the male are numerous short parallel oblique striæ one of which at least is most elegantly pectinate: in the female these crests are less numerous and less distinct: the upper surface of the dactylus of the male is milled, the lamellæ increasing in size and coarseness from behind forwards.

At the distal end of the posterior border of the meropodites of the legs are three or four strong spines, decreasing in size from behind forwards, but there is no subterminal spine on the anterior border: in other respects, except that the dactyli are slightly shorter, the legs are very similar to those of *S. quadratum*. The male abdomen is broad.

In the Indian Museum are 8 specimens from Mergui: the carapace of the largest is 7 millim. long and 9 millim. broad.

### 104. *Sesarma lanatum*, n. sp.

Carapace deepish, dorsally flat, everywhere covered, as also are the appendages, with a dense fur amid which are freely scattered little dense

adherent tufts of hair resembling tubercles. When this covering is removed the surface of the carapace is smooth and polished, with the gastric region and its four post-frontal tubercles distinct.

The length of the carapace is considerably less than its breadth between the antero-lateral angles.

Front a little more than half the breadth of the carapace, obliquely deflexed, its free margin nearly straight. The lateral borders of the carapace are nearly parallel and anteriorly are cut into three blunt lobes of nearly equal size—including the outer orbital angle.

The chelipeds when denuded have a smooth surface and sharp borders: they are similar in the two sexes, except that they are much more massive in the male. There is a blunt angular projection at the far end of the inner border of the arm, the inner angle of the wrist is pronounced but not dentiform, and the upper border of the palm is traversed fore and aft by a fine sharp crest: in the male the palm is at least as high as long: the upper border of the dactylus is faintly crenulate in its proximal two-thirds.

The meropodites of the legs are foliaceous, but their breadth is less than half their length: their borders are entire. The dactyli of the legs are claw-like, their length being about three-fourths that of the propodites.

The abdomen of the male is narrow.

In the Indian Museum are 4 specimens from Bombay and Karachi: the carapace of the largest is  $8\frac{1}{2}$  millim. long and 10 millim. broad.

#### 105. *Sesarma tæniolatum*, White.

*Sesarma tæniolatum*, White, List Crust. Brit. Mus. p. 38 (1847): Miers, P. Z. S. 1877, p. 137, and Ann. Mag. Nat. Hist. (5) V. 1880, p. 313: de Man, Notes Leyden Mus. II. 1880, p. 26: Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, p. 218: de Man, Zool. Jahrb., Syst., II. 1887, pp. 647, 666, and IX. 1895-97, p. 166, and Journ. Linn. Soc., Zool., XXII. 1888, p. 181, and in Weber's Zool. Ergebn. Niederl. Ost-Ind. II. p. 330: Bürger, Zool. Jahrb., Syst., VII. 1893-94, p. 615, and Ortmann, *ibid.* p. 720.

*Sesarma Mederi*, Milne Edwards, Ann. Sci. Nat. Zool. (3) XX. 1853, p. 185: Tozzetti, "Magenta" Crust. p. 136, pl. ix. figs. 1 a-i.

Carapace deep, nearly flat dorsally, square, its length being slightly less than its breadth between the antero-lateral angles. All the regions are quite well defined, and the 4 post-frontal tubercles—the middle two of which are not very much broader than the outer ones—are very prominent. The whole dorsum of the carapace is covered with tufts of hair, which are largest and longest anteriorly. There are some oblique striae on the sides of the epibranchial regions.

Front half, or a little more than half, the breadth of the carapace,

not very deep, its free margin strongly sinuous. Lateral borders of the carapace nearly parallel, armed with one acute tooth behind the acute outer orbital angle.

The chelipeds are similar in the two sexes, except that they are a good deal more massive and more sharply sculptured in the male. They are not quite twice the length of the carapace: the outer surface of the arm and wrist are granular-rugose, the outer surface of the palm is granular, and there is a transverse granular ridge on the inner surface of the palm: the upper border of the arm is crest-like and ends in a sharp tooth, and the distal end of the inner border forms an acute angular serrate lobe: the inner angle of the wrist is dentiform: close to and nearly parallel with the upper border of the palm runs a fine and very finely and evenly pectinate crest: along the upper border of the dactylus runs a very elegantly milled crest of from 40 to 60 fine teeth. In the male the palm is at least as high as long, the fingers meet only at tip, and the dactylus is about twice the length of the upper border of the palm.

The meropodites of the legs are foliaceous, but their greatest breadth is not quite half their length: there is a sharp subterminal spine on their anterior border only. The dactyli of the legs are two-thirds, or more, the length of the propodites. The 3rd pair of legs, which are the longest, are a little more than twice the length of the carapace.

In the Indian Museum are 9 specimens, from Mergui, the Andamans, and Penang. The carapace of a large specimen is nearly 38 millim. long and nearly 40 broad.

#### 106. *Sesarma tetragonum* (Fabr.).

*Cancer tetragonus*, Fabricius, Ent. Syst., Suppl. p. 341.

*Cancer fascicularis*, Herbst, Krabben etc. III. i. 49, pl. xlvii. fig. 5.

*Sesarma tetragona*, de Man, Zool. Jahrb., Syst., II. 1887, p. 646: Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 392.

This species closely resembles *S. tæniolutum*, from which it differs in the following characters:—

- (1) the carapace is slightly broader:
- (2) the subterminal lobe of the inner border of the arm is smaller, while the tooth at the inner angle of the wrist is more pronounced:
- (3) the fine striated crest along the upper border of the palm is shorter:
- (4) the crest of the upper surface of the movable finger of the chelæ is coarsely crenulate.

In the Indian Museum are 8 specimens from Ceylon, Madras, the Mahanaddi Delta, and the Ganges Delta. The carapace of a large one is 40 millim. long and 43 millim. broad.

### 107. *Sesarma Brockii*, de Man.

*Sesarma Brockii*, de Man, Zool. Jahrb., Syst., 1887, p. 651, and IX. 1895-97, p. 171, and Archiv f. Naturges. LIII. 1887, i. p. 373, pl. xvi. fig. 3: Thallwitz, Abhand. Zool. Mus. Dresden, 1890-91, No. 3, p. 39: Ortman, Zool. Jahrb., Syst., VII. 1893-94, p. 721.

Resembles *S. tæniolatum*, but differs in the following characters:—

(1) the carapace is *shallow* and much depressed, its length is just equal to its breadth between the antero-lateral angles, its dorsal surface is not so hairy, and its sculpture though similar is not so deeply cut: the front is not so sinuous.

(2) the lateral borders of the carapace are *slightly divergent* posteriorly, and there are *two* teeth—the posterior of which is, however, extremely small—behind the outer orbital angle:

(3) no subterminal spine on the upper border of the arm: no transverse granular crest on the inner surface of the palm:

(4) the milled crest along the upper border of the dactylus of the chelæ is lower and has only about 25 teeth:

(5) the legs are longer, their meropodites are narrower and their dactyli—except in the case of the 1st pair of legs—are *barely half the length of their propodites*.

In the Indian Museum there is a young male from the Andamans. In this specimen the chelipeds are not massive and are very little longer than the carapace.

### 108. *Sesarma latifemur*, n. sp.

Closely related to *S. elongatum*, A. M. Edw.

This species belongs to the same natural group as *S. tæniolatum*, from which it differs only in the following characters:—

(1) the carapace is *shallow* and much depressed, and its length is decidedly *more* than its breadth between the antero-lateral angles, its dorsal surface is not quite so hairy and its post-frontal lobes are deeper cut:

(2) the lateral borders of the carapace are decidedly *divergent* posteriorly and have no tooth behind the orbital angle:

(3) the male chelipeds are little longer than the carapace: the crest-like upper border of the arm does not end in a spine: the inner

angle of the wrist, though well pronounced, is not spiniform: the transverse beaded ridge on the inner surface of the palm is very short:

(4) the dactylus of the chelæ is not nearly twice the length of the upper border of the palm, and the milled crest on its upper surface consists of not more than 40 teeth:

(5) the meropodites of the legs are remarkably foliaceous, their greatest breadth, in the case of the 2nd and 3rd pairs, being more than half their length: all the leg joints are thinner and flatter:

(6) the dactyli of the legs are remarkably short, their length, in the case of the 2nd and 3rd pairs, being *less than half* the length of their propodites.

In the Indian Museum is a single male from the Andamans: its carapace is nearly 35 millim. long, and a little over 30 millim. broad across the antero-lateral angles.

#### 109. *Sesarma politum*, de Man.

*Sesarma polita*, de Man, Zool. Jahrb. Syst. II. 1887, p. 654: Journ. Linn. Soc., Zool., XXII. 1888, p. 189, pl. xiii. figs 7-9.

Carapace shallow and much depressed, a good deal longer than broad, all the regions well defined: the four post-frontal lobes of the gastric subregions are deep-cut and very prominent, their anterior overhanging edges are serrated and their surface bears some transversely arranged sharpish tubercles: the two middle lobes are decidedly larger than the outer ones. There are no oblique striæ on the epibranchial regions.

Front more than half the breadth of the carapace, its free margin markedly sinuous. The lateral borders of the carapace are nearly parallel though slightly sinuous: there are two well cut teeth behind the outer orbital angle.

Chelipeds equal, and not so very much longer than the carapace: the outer surface of the arm wrist and hand are closely beset with small tubercles, which in places have a squamiform look, and the inner surface of the palm is granular but has no transverse ridge: the inner and outer borders of the arm, the inner border of the wrist, and the upper border of the palm and movable finger are conspicuously serrulate, and there is also a noticeable dilatation near the far end of the inner border of the arm. There are no pectinated crests of any sort on the palm, and the fingers—both surfaces of which are smooth and polished—have no large gap between them when closed.

The legs are shortish, the 3rd pair being hardly  $1\frac{1}{2}$  times the length

of the carapace, and rather slender. The meropodites are nearly three times as long as broad, they have a subterminal spine on the anterior border and in the case of the 1st pair their posterior border is distinctly serrulate. The dactyli are rather short, their length, in the third pair, being less than two-thirds the length of the propodite: they are remarkably tomentose.

In the Indian Museum there is a single specimen from Mergui: its carapace is 38 millim. long and 35 millim. broad.

110. *Sesarma oceanicum*, de Man.

*Sesarma oceanica*, de Man, Zool. Jahrb., Syst., IV. 1889, p. 429, pl. x. fig. 9, and Notes Leyden Mus. XIII. 1891, p. 52.

Carapace shallow, depressed, its length greater than its breadth between the antero-lateral angles; all the regions are fairly well defined and the 4 post-frontal lobes of the gastric subregions are prominent, the middle pair being more than twice as broad as the two outer ones: the surface of the carapace is granular anteriorly and punctate posteriorly, and near the sides are numerous short oblique striæ.

Front half the breadth of the carapace, deepish, its free margin a little sinuous: orbits not at all oblique: the lateral borders of the carapace have a slight, but distinct, convex curve, and there are two teeth—the posterior of which is extremely small—behind the outer orbital angle.

Chelipeds equal, not much longer than the carapace: the outer surface of the arm and wrist are rugose and both surfaces of the palm are studded with sharpish granules: there is a small angular lobe near the far end of the inner border of the arm, and the inner angle of the wrist is dentiform: the palm is not quite as high as long, close to and nearly parallel with its upper border is a fine and finely granular ridge: the dactylus is about half as long again as the upper border of the palm, and there are some sharpish granules along its upper surface.

The legs are slender: their meropodites are more than three times as long as broad and are not foliaceous, they have a subterminal spine on the anterior border only: their dactyli are shortish, those of the 3rd pair being less than two-thirds the length of their propodites, and are densely plumed: the 3rd pair of legs are about  $2\frac{1}{2}$  times the length of the carapace.

In the Indian Museum is a single specimen from the Nicobars: its carapace is 20 millim. long, and 16.5 millim. across the antero-lateral angles.

111. *Sesarma Finni*, n. sp.

Near *S. maculata*, de Man.

Carapace shallow, depressed, flat, perfectly square, its length being equal to its breadth at the antero-lateral angles and its sides being parallel: the regions are indicated, but not emphasized, and the 4 post-frontal lobes are sharply prominent, the middle pair being much broader than the outer ones.

Front half the breadth of the carapace, deepish, its free edge nearly straight: two little teeth on the lateral border of the carapace, behind the outer orbital angle.

In the chelipeds of the female the outer surface of the arm wrist and hand are granular; the upper border of the arm ends acutely, and the inner border ends in a spine; the inner angle of the wrist is pronounced, but is not dentiform; and the upper surface of the palm is traversed, fore and aft, close to the upper border, by a fine and finely milled ridge.

Legs long and slender, the 3rd pair being more than  $2\frac{1}{2}$  times the length of the carapace: their meropodites are not foliaceous, being about three times as long as broad, and they have a subterminal spinule on the anterior border only: their dactyli are long and slender, those of the 3rd pair being more than three-fourths the length of the propodite: the propodites and dactyli of all the legs are fringed with short stiff sharp bristles.

The species is represented by a small female from the Andamans: its carapace is not quite 11 millim in either diameter.

112. *Sesarma longipes*, Krauss.

*Sesarma longipes*, Krauss, Sudafr. Crust. p. 44, pl. iii. fig. 2: Milne Edwards, Ann. Sci. Nat., Zool., (3) XX. 1853, p. 199: Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, p. 216: de Man, Zool. Jahrb., Syst., II. 1887, p. 651.

The length of the carapace is equal to its breadth at the antero-lateral angles, but as the lateral borders of the carapace diverge considerably, from before backwards, the *greatest* breadth of the carapace (at the level of the 2nd pair of legs) is considerably more than the length.

Carapace deepish, very slightly convex; its regions are not very well defined, but the median longitudinal groove of the gastric region is deep, and the 4 post-frontal lobes are sharply prominent, the middle pair being much broader than the outer ones.

Front half the extent of the anterior border of the carapace, the free margin slightly sinuous: the divergent lateral borders of the carapace have a tooth of good size behind the outer orbital angles.

Chelipeds in the female not half as long again as the carapace: the outer surface of the arm and wrist are rugulose, and both surfaces of the palm are studded with sharpish granules: the upper border of the arm ends acutely, but there is no spine at the end of the inner border; the inner angle of the wrist is pronounced, almost dentiform; there are no granular or pectinated crests of any kind on the palm: the fingers are little bent and leave no large gap between them when closed, there are some sharpish granules along the upper border of the dactylus, and along the lower border of the fixed finger.

The legs are remarkably uneven in length, the third pair being more than  $2\frac{1}{2}$  times the length of the carapace; the meropodites are not exactly foliaceous, their greatest breadth being hardly two-fifths of their length, and they have a subterminal spine on the anterior border only; the dactyli are remarkably long, those of the third pair being as long as their propodites.

In the Indian Museum are 2 females from the Andamans: the carapace of the larger one is 18 millim. long and 20 millim in its greatest breadth posteriorly.

### 113. *Sesarma Kraussi*, de Man.

*Sesarma Kraussi*, de Man, Zool. Jahrb., Syst., II. 1887, p. 652, and Journ. Linn. Soc., Zool., XXII. 1888, p. 193, pl. xiv. figs 1-3.

Differs from *S. longipes*, which it closely resembles, in the following characters:—

(1) the four post-frontal lobes are not so prominent, the outer ones, indeed, being very inconspicuous:

(2) the free edge of the front is more sinuous, owing to the depth of the median notch:

(3) there are two distinct teeth on the lateral border of the carapace, behind the outer orbital angle:

(4) the outer surface of the wrist and both surfaces of the palm are nearly smooth, and there is a row of sharp granules along the outer surface of the fixed finger: the upper border of the arm does not end acutely:

(5) the legs are even longer and slenderer, the 3rd pair being more than  $3\frac{1}{2}$  times the length of the carapace: the meropodites of the legs are at least 3 times as long as broad.

In the Indian Museum is a single male from the Nicobars: its carapace is 9 millim. long and 11 millim. in greatest breadth.

Heller ("Novara" Crust. pp. 64, 65) includes the following species in the Indian fauna:—

*S. Eydouxi*, Milne Edwards, Ann. Sci. Nat., Zool., (3) XX. p. 184 (Madras).



*S. indica*, Milne Edwards, *tom. cit.* p. 186 (Ceylon, Nicobars).

*S. gracilipes*, Milne Edwards, *tom. cit.* p. 182 (Nicobars).

### SARMATIUM, Dana.

*Sarmatium*, Dana, Silliman's Amer. Journ. Sci. (2) XII. 1851, p. 263, and Proc. Ac. Nat. Sci. Philad. 1851, p. 231, and U. S. Expl. Exp. Crust. pt. I. p. 357; Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, p. 212; de Man, Zool. Jahrb., Syst., II, 1887, p. 659.

*Metagrapsus*, Milne Edwards, Ann. Sci. Nat., Zool., (3) XX. 1853, p. 188.

This genus, which I almost agree with Dr. de Man in regarding as only a subgenus of *Sesarma*, differs from *Sesarma* in the following particulars:—

(1) the front, instead of being abruptly and vertically deflexed, is gradually declivous and obliquely deflexed:

(2) the antero-lateral borders of the carapace are usually a little arched, instead of being in the same straight line with the postero-lateral borders:

(3) the abdomen of the male does not completely coincide with the breadth of the sternum at the level of the 5th pair of legs; and in the female the terminal segment is not deeply impacted in the penultimate segment.

*Distribution*: West Indies, West coast of Africa, Indo-Pacific.

#### 114. *Sarmatium crassum*, Dana.

*Sarmatium crassum*, Dana, Proc. Ac. Nat. Sci. Philad. 1851, p. 251; U. S. Expl. Exp. Crust. pt. I. p. 358, pl. xxiii. figs. 1 a-d; Milne Edwards, Ann. Sci. Nat., Zool., (3) XX. 1853, p. 189; Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, p. 212; de Man, Zool. Jahrb. Syst. II. 1887, p. 660.

Carapace deep, broader than long, broader behind than in front, smooth, with very faint indications of regions and no oblique striae on the epibranchial regions: of the post-frontal lobes the two middle ones alone are distinct, and they are not prominent, they occupy almost all the space between the orbits.

The front is half the extent of the anterior border of the carapace, its free edge is very little concave in the middle line. The antero-lateral borders of the carapace are distinctly arched and are cut into 2 broad blunt lobes (one of which is the orbital angle) followed by a small tooth.

Chelipeds "of male short, hand above transversely four to five-plicate, externally nearly smooth, moveable finger with four short rudiments of spines, carpus mostly smooth, a few seriate granules above" In the female the transverse plications of the upper surface of the hand are very indistinct and the dactylus is smooth.

Legs not much compressed: the meropodites are not broadened, there is a spinule at the distal end of their anterior border: the dactyli are slender but are shorter than the propodites.

In the Indian Museum is a young female from the Nicobars: its carapace is 8 millim. long and 9 broad.

Henderson (Trans. Linn. Soc., Zool., (2) V. 1893, p. 393) describes a variety of *Sarmatium indicum* (Milne Edwards, Nouv. Archiv. du Mus. IV. 1868, p. 174, pl. xxvi. figs. 1-5) from Cochin.

#### METASESARMA, Edw.

*Metasesarma*, Milne Edwards, Ann. Sci. Nat. Zool. (3) XX. 1853, p. 188: Kingsley, Proc. Acad. Nat. Sci. Philad. 1880, p. 211: de Man, Zool. Jahrb., Syst. IX. 1895-97, p. 128.

The most marked difference between this genus and *Sesarma*, which it closely resembles, is that the tooth at the inner angle of the orbit meets the thickened angle of the front, so as to completely exclude the antennæ from the orbit.

The regions of the carapace are not defined, and the post-frontal tubercles are inconspicuous: the front is vertically deflexed as in *Sesarma*, but is deeper and overhangs the epistome: the reticulate appearance of the pterygostomian and neighbouring regions is finer, closer, and more confused: the orbits are more open below: the antennæ are much smaller: the legs are not so broad and compressed.

The *Metasesarmata* are land and fresh-water crabs of the Indo-Pacific region.

#### 115. *Metasesarma Rousseauxii*, Edw.

*Metasesarma Rousseauxii*, Milne Edwards, Ann. Sci. Nat. Zool. (3) XX. 1853, p. 188, and Archiv. du Mus. VII. 1855, p. 158, pl. x. figs. 1 a-c: Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, p. 211: de Man, Zool. Jahrb., Syst., IV. 1889, p. 439, and IX. 1895-97, p. 138, and X. 1898, pl. xxix. fig. 28, and in Weber's Zool. Ergebn. Niederl. Ost-Ind. II. p. 350: Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 392: Ortmann, Zool. Jahrb., Syst., VII. 1893-94, p. 717.

*Sesarma Aubryi*, de Man (nec A. M. Edw.), Journ. Linn. Soc., Zool., XXII. 1888, p. 168.

Carapace deepish, a little broader than long, smooth to the naked eye, slightly convex fore and aft: a short semilunar groove separates the gastric from the cardiac region, and there is a median longitudinal post-frontal groove of some depth: the middle pair of post-frontal tubercles are distinct, though not prominent, but the outer ones are hardly distinguishable.

Front a little more than half the breadth of the carapace, vertical, deep, somewhat spathulate, the free edge convex and very slightly sinuous.

Sides of the carapace slightly curved and convergent posteriorly, no tooth behind the outer orbital angle.

The chelipeds are longer and more massive in the male, but are otherwise similar in both sexes: in the male they are less than  $1\frac{1}{2}$  times the length of the carapace. To the naked eye they are smooth, except for a patch of vesiculous granules in the middle of the inner surface of the palm. The inner angle of the wrist is sharply pronounced, and the upper border of the palm and of the base of the dactylus have a few small blunt serrulations. The palm is as high as long, the dactylus is about  $1\frac{1}{2}$  times the length of the upper border of the palm, the fingers, though a little hollowed at tip, are subacute and have no gap between them when closed.

Legs rather slender, smooth and unarmed to the naked eye: the meropodites are not broadened: the dactyli are as long as their propodites and like them are fringed with dark spine-like bristles. The 3rd pair of legs, which are the longest, are less than twice the length of the carapace.

In the Indian Museum are 61 specimens from the Andamans and Nicobars, Mergui, Ganges Delta, Madras, and Minnikoy (Laccadives). Many of the specimens were taken on land, hiding under timber, in which situation their curious mottled coloration must be protective. The largest specimen has a carapace 14 millim. long by nearly 17 broad.

#### CLISTOCÆLOMA, A. M. Edw.

*Clistocæloma*, A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 310: Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, p. 219.

Differs from *Sesarma* only in the following characters:—

(1) the tooth at the inner angle of the lower border of the orbit meets the front, as in *Metasesarma*, so as to completely exclude the antennæ from the orbit:

(2) the reticulation of the sidewalls of the carapace resembles that of *Sesarma*, but, on denudation, the lines of granules are found to be absent, so that the meshwork is made up of hairs entirely:

(3) the merus of the external maxillipeds is shorter.

From *Metasesarma* this genus is distinguished by the lobulation of the dorsum of the carapace and the dentate lateral borders.

If *Metasesarma* is to be classed as a subgenus of *Sesarma* as it has been, and with undoubted reason, by Dr. de Man, the same course might be taken with *Clistocæloma*.

116. *Clistocæloma balansæ*, Edw.

\* *Clistocæloma balansæ*, A. Milne Edwards, *Nouv. Archiv. du Mus.* IX. 1873, p. 311, pl. xvii. fig. 1.

The whole body and the appendages, except the tips of the dactyli of the legs, are everywhere covered with a dark dense adherent fur, amid which, on the dorsal aspect, are numerous clumps of tomentum that look like tubercles: the legs, in addition, have a shaggy fringe of coarse hair.

Carapace square, as long as broad, somewhat depressed: when denuded it is smooth and polished, with all the regions well defined and boldly and symmetrically lobulated, and the post-frontal lobes prominent, the outer ones being again subdivided into two tubercles.

Front much more than half the breadth of the carapace, nearly vertically deflexed, deepish, its free margin sinuous and turned up to form a trenchant horizontal edge.

The lateral borders of the carapace are cut, anteriorly, into three lobes including the outer orbital angle.

Chelipeds subequal, nearly similar in size in both sexes, not more massive than the legs, shorter even than the 1st pair of legs, which are little longer than the carapace. When denuded they are smooth, except that the upper surface of the wrist is a little lumpy: the inner border of the arm is a little convex distally, but does not expand into an undoubted lobe: the palm is higher than long, but is by no means swollen or massive, and in the male only its upper surface is traversed, obliquely fore and aft, as close as possible to the upper border, by a fine microscopically-pectinate crest: the fingers are subacute, though slightly hollowed at tip, and have no wide gap between them when closed, and the fixed finger is shorter and deeper than the dactylus, the dactylus is nearly twice as long as the upper border of the palm, and in the male its upper border is milled with about 14 or 15 lamellæ.

Legs markedly unequal: the third pair, which are the longest, are not quite twice as long as the carapace. In all, the meropodites are thin and broad, and the dactyli are not two-thirds as long as their propodites.

In the Indian Museum are a male and two females from the Nicobars. The carapace of the largest is 19 millim. in either diameter.

117. *Clistocæloma merguense*, de Man.

*Clistocæloma merguensis*, de Man, *Journ. Linn. Soc., Zool.*, XXII. 1888, p. 195, pl. xiii. fig. 10, and *Notes Leyden Mus.* XII. 1890, p. 92: and *Zool. Jahrb., Syst.*, IX. 1895-97, p. 339, and X. 1898, pl. xxii. fig. 40.

This species differs from *C. balansæ* in the following particulars:—

(1) the carapace is decidedly broader than long, its lobulations are not nearly so bold and convex, and the outer post-frontal lobules may be entire:

(2) the free edge of the front is not turned up to form a trenchant horizontal crest, although it is well defined:

(3) the chelipeds of the male are far more massive than any of the legs; the inner border of the arm is dilated distally; the palm is a good deal swollen, the pectinate crest that traverses its upper surface is longer, and its inner surface is more granular; the fingers are more widely separated when closed, and the lamellar tubercles along the upper border of the dactylus are more numerous:

(4) it is a smaller species.

In the Indian Museum are 10 specimens from the Nicobars: the carapace of the largest egg-laden female is 10 millim. long and 12 broad.

#### METAPLAX, Edw.

*Metaplaz*, Milne Edwards, Ann. Sci. Nat. Zool. (3) XVIII. 1852, p. 161.

*Rhaconotus*, Gerstaecker, Archiv f. Naturges. XXII. 1856, i. p. 140, and Kingsley, Proc. Ac. Nat. Sci. Philad., 1880, p. 213.

*Metaplar*, de Man, Journ. Linn. Soc., Zool., XXII. 1888, pp. 153-155.

Carapace quadrilateral, somewhat depressed, a good deal broader than long, the regions well or fairly defined and the cervical and branchial grooves distinct.

Front declivous, its breadth about a third or a fourth that of the carapace, the convexity of its free edge impinges on the epistome to help in forming the broad interantennular septum.

Lateral borders of the carapace straight, or a little arched anteriorly, nearly parallel, cut into 4 or 5 teeth of which the last one or two are very inconspicuous. The posterior part of the sidewalls of the carapace with some hairs curving towards the incurvent branchial opening.

Orbits of good depth: their outer wall incomplete, their lower border crenulate: the eyes do not fill the orbits and the eyestalks are not prolonged.

The antennules fold nearly transversely: the septum between them is broad. The antennæ lie in the orbital hiatus, their basal joint is extremely short, their flagellum is of fair length.

Epistome short, but well defined and prominent: buccal cavern squarish: the external maxillipeds leave between them a large rhomb-

oidal gap, in which the mandibles are exposed: a broad oblique groove, bounded internally by a line of hairs, runs from a point behind the antero-external angle of the ischium to the anterior edge of the merus: the merus is truncated, and the foliaceous propodite articulates near its antero-external angle.

The chelipeds differ very markedly in the sexes: in the female they are shorter and slenderer than the legs, but in the male they are longer and much more massive than the legs. In the male there is always a short oblique horny crest, either on or close to and parallel with, the inner border of the arm, as in many species of *Macrophthalmus*: it probably, as Dr. de Man suggests, is scraped against the lower border of the orbit to produce a musical sound.

Legs slender, the first and last pairs much shorter than the 2nd and 3rd pairs—the 3rd pair the longest.

The abdomen in the male does not quite cover the sternum between the bases of the last pair of legs: it may have all 7 segments distinct, or, rarely, the 3rd 4th and 5th segments may be fused together: in the female all 7 segments are separate and the 7th is small and deeply impacted in the 6th, as in *Sesarma*.

*Distribution*: Estuaries and mudflats of the Oriental littoral.

The species of *Metaplex* have many points of resemblance with the Ocypodoid genus *Macrophthalmus*, and this is all the more likely to lead to confusion as the two genera share the same habitat and have the same manner of life; but there is no doubt of the true position of *Metaplex* among the *Sesarminæ*.

#### *Key to the Indian species of Metaplex.*

- I. Anterior border of carpi and propodites of legs spiny: chelipeds in the male 3 times the length of the carapace..... *M. crenulata*.
- II. Anterior border of carpopodites and propodites of legs smooth: male chelipeds less than 3 times the length of the carapace:—
  1. Dactylus of chela of male without any prominent lobe on its dentary edge: chelipeds of male equal:—
    - i. 3rd 4th and 5th abdominal segments fused together in the male..... *M. indica*.
    - ii. All the abdominal segments separate:—
      - a. Length of the carapace about three-fourths the breadth: orbital portion of lower border of orbit with 4 or 5 teeth... *M. dentipes*.
      - b. Length of the carapace less than three-fourths the breadth: orbital portion of lower border of orbit with 9 or 10 teeth... *M. distincta*.

Dactylus of chelæ of male with a prominent lobe projecting on the dentary edge: chelipeds of male markedly unequal:—

- i. Palm of larger cheliped of male longer than high. *M. elegans.*
- ii. Palm of larger cheliped of male higher than long. *M. intermedia.*

### 118. *Metaplas indica*, Edw.

*Metaplas indicus*, Milne Edwards, Ann. Sci. Nat., Zool., (3) XVIII. 1852, p. 161, and Archiv. du Mus. VII. 1855, p. 165, pl. xi. figs. 2-2c.

Carapace about two-thirds as long as broad, deepish, a little convex, its surface smooth, the regions and the cervical and epibranchial grooves faint.

Front about a third the greatest breadth of the carapace. Lateral borders of the carapace nearly straight, cut into 4 teeth, of which the first 2 are large, the 3rd very small, and the 4th very inconspicuous.

Lower border of the orbit of the male continued to the level of the first notch in the lateral border of the carapace, unevenly crenulate.

Chelipeds of the male equal, more than  $2\frac{1}{2}$  times the length of the carapace, smooth and unarmed, to the naked eye: arm long and slender, projecting far beyond the carapace, its muscular crest is almost on the inner border, close to its proximal end: palm nearly twice as long as high, increasing in height from its proximal to its distal end: fingers slender, acute, not noticeably channelled and only moderately incurved, neither of them have any large lobes on their dentary edge, the dactylus is hardly shorter than the upper border of the palm, and though it is deflexed is not hooked.

Legs quite unarmed, the carpopodites and propodites of the two middle pairs remarkably tomentose: the third pair of legs are a little more than twice as long as the carapace.

The 3rd 4th and 5th abdominal segments of the male are fused together—though the sutures are not obliterated on either side, but only in the middle—to form a single piece.

In the female the chelipeds are very slender, quite smooth, a little longer than the carapace, and the lower border of the orbit is finely and evenly serrulate.

In the Indian Museum are a male and a female from Karachi: the carapace of the male is 10 millim. long and 14.5 millim. broad.

### 119. *Metaplas distincta*, Edw.

*Metaplas distinctus*, Milne Edwards, Ann. Sci. Nat., Zool., (3) XVIII. 1852, p. 162, pl. iv. fig. 27: de Man, Journ. Linn. Soc., Zool., XXII. 1868, p. 158, pl. x. figs. 7-9: Henderson, Trans. Linn. Soc., Zool., (2) V. 1898, p. 391.

Differs from *M. indica* in the following characters:—

(1) the carapace is more than two-thirds—nearly three-quarters—as long as broad:

(2) the lower border of the orbit of the male is prolonged to the level of the second notch in the lateral border of the carapace, and its orbital portion is cut into 9 or 10 little, blunt, obscurely-bilobulate teeth, which decrease very regularly in size from within outwards:

(3) the chelipeds of the male are hardly  $2\frac{1}{2}$  times the length of the carapace; the arm has denticulate borders—the inner border being a little dilated distally—and is not elongate and slender, its muscular crest runs obliquely away from the inner border and is nearer to the middle of that border: the palm is only about half again as long as high: the fingers are obliquely-truncated and channelled at tip, the fixed finger has a lobe (though not a very large one) on its dentary edge, the dactylus is hardly shorter than the upper border of the palm and has a strong hook-like curve:

(4) the anterior border of the meropodites of the legs is armed, in the first and last pairs with a single subterminal spine, in the middle two pairs with several spines; the tomentum on the carpopodites and propodites of the middle two pairs of legs is not so thick:

(5) the abdomen of the male consists of 7 separate segments.

In the Indian Museum are 8 specimens from Madras, Coconada, Mergui, and the Nicobars: the carapace of the largest male is 15 millim. long and 21 broad.

## 120. *Metaplex dentipes* (Heller).

*Helice dentipes*, Heller, Novara Crust. p. 62, pl. v. fig. 5: Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, p. 220.

*Metaplex dentipes*, de Man, Journ. Linn. Soc., Zool., XXII, 1888, p. 162, pl. xi. figs. 1-3.

This is little more than a large variety of *M. distincta*, from which it differs in the following particulars:—

(1) the carapace is less transverse, its length being slightly more than three-fourths of its breadth:

(2) the lower border of the orbit of the male is divided, in its orbital portion, into 4 or 5 blunt, broad, compressed teeth decreasing in size from within outwards, and each tooth has a little cusp at its outer end:

(3) in the chelipeds, the inner border of the arm is more dilated distally; the lobe on the dentary edge of the fixed finger is not so convex, and the dactylus is as long as the upper border of the palm



and is not so strongly hooked; the dactylus also sometimes has an enlarged tooth—not a distinct lobe—near the middle of its dentary border:

(4) the anterior border of the meropodites of the legs is very often quite free from spines, but sometimes there are inconspicuous spinules where spines exist in *M. distincta*.

In the Indian Museum are 23 specimens from the banks of the Hooghly, the mud-flats of Arakan and Tenasserim, and Mergui. The carapace of a large male is a little over 21 millim. long and 29 millim. broad.

### 121. *Metaplas elegans*, de Man.

*Metaplas elegans*, de Man, Journ. Linn. Soc., Zool., XXII. 1888, p. 164, pl. xi. figs. 4-6, and Zool. Jahrb., Syst., VIII. 1894-95, p. 596.

*Metaplas crassipes*, de Man, in Weber's Zool. Ergebn. Niederl. Ost-Ind. II. 1892, p. 325, pl. xix. fig. 12 (*ipso teste*).

Resembles *M. indica* in the form of the carapace, but can be recognized by the following characters:—

(1) the grooves of the carapace are fainter:  
(2) the lower border of the orbit instead of being irregularly cut into dentiform lobules is very finely and regularly pectinate:

(3) the chelipeds in the male are not  $2\frac{1}{2}$  times as long as the carapace and are distinctly unequal, the hand of one being decidedly larger than its fellow: the arm is not elongate, its edges are granular, and its musical crest, which is very fine, stands at the middle of the inner border, running obliquely parallel with that border: the larger palm is only a little longer than high and its inner surface is granular, its fingers are obliquely truncate and strongly channelled, and both of them have a lobe near the middle of their dentary border, the dactylus also is strongly curved, at any rate in the larger hand:

(4) in the first pair of legs the meropodites have a single subterminal spine on the anterior border, in the 2nd pair there are from three to six spines, and in the 3rd and 4th pairs from seven to ten: moreover at the extreme distal end of the *posterior* border of the meropodites of the two middle pairs of legs there may be two or three spinules:

(5) the abdomen of the male is broader, and has all 7 segments separate.

In the Indian Museum are 32 specimens from the Godavari Delta and from Mergui: the carapace of the largest male is 10.5 millim. long and 16 broad.

122. *Metaplex intermedia*, de Man.

• *Metaplex intermedius*, de Man, Journ. Linn. Soc., Zool., XXII. 1888, p. 166, pl. xi, figs. 7-9.

Differs from *M. indica* in the following characters:—

(1) In the male the lower border of the orbit is continued a little beyond the first notch in the antero-lateral border of the carapace, and at its inner end it is cut into a series of 5 or 6 little even teeth that decrease in size from within outwards, and then it gradually becomes minutely and regularly pectinate:

(2) the chelipeds of the male are markedly unequal, the difference in size being in the hand: their length is about  $2\frac{1}{2}$  times that of the carapace: the arm is of no great length and is somewhat broadened across the middle, its edges are granular, and its muscular crest lies in the middle of the inner border, close to and nearly parallel with that border: the palm has granular edges and is much compressed at its antero-inferior corner; in the larger cheliped *the hand is at least as high as long*: the fingers are obliquely truncated and strongly channelled; in the larger hand the dactylus is hooked and has a lobe on its cutting edge near the proximal end, while the fixed finger is broad, is thin and compressed at its basal end, and presents on its cutting edge a notch (corresponding with the lobe on the dactylus) followed by a high lobe that descends obliquely to the tip of the finger:

(3) near the far end of the anterior border of the meropodites of the legs is a spine:

(4) the abdomen of the male has all 7 segments distinct, and is rather broadly triangular.

In the Indian Museum are 11 specimens from the Godavari Delta, the Gangetic Delta and Mergui. The carapace of the largest male is  $9\frac{1}{2}$  millim. long and 15 broad.

123. *Metaplex crenulata*, Gerstaecker.

*Rhaconotus crenulatus*, Gerstaecker, Arch. f. Naturges. XXII. i. 1856, p. 142, pl. v. fig. 5: Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, p. 213.

*Metaplex crenulatus*, de Man, Journ. Linn. Soc., Zool., XXII. 1888, p. 156, and Zool. Jahrb., Syst., IV. 1889, p. 439.

Carapace about three-fourths as long as broad, convex, with the regions well defined and the cervical and epibranchial furrows deep and coarse, its surface pitted.

Front about a fourth the greatest breadth of the carapace. Lateral borders of the carapace cut into five teeth, the edges of which are serrated; the anterior part of the lateral borders is distinctly arched.

The lower border of the orbit, in the male, extends beyond the first notch of the lateral border of the carapace, its inner end is sharp entire and sinuous, but all the rest of its extent is elegantly beaded.

Chelipeds of the male three times the length of the carapace, the borders of the wrist and hand, and the inner border of the wrist, sharply granular or serrulate: arm long and slender, somewhat dilated at its proximal end, the muscular crest close to the proximal end and almost on the inner border: the palm gradually increases in height from behind forwards, its greatest height is about half its length, along the middle of its inner surface is a row of granules ending in a granular patch: fingers slender, acute, incurved, not channelled, the extreme length of the dactylus is only about three-fourths that of the upper border of the palm: there are no prominent lobes on the dentary edges of the fingers.

Both borders of the meropodites of the legs, as well as the anterior border of the carpopodites and propodites, are spinulate. The third pair of legs are nearly as long as the male chelipeds.

In the abdomen of the male, which is narrow, all 7 segments are distinct, the penultimate segment being square.

In the female the chelipeds are very slender and are about  $1\frac{1}{2}$  times the length of the carapace, and the lower border of the orbit is elegantly pectinate.

In the Indian Museum are 11 specimens from the Sunderbunds and Mergui. The carapace of the largest male is 30 millim. long and 40 broad.

### Sub-family *PLAGUSIINA*, Dana.

#### *PLAGUSIA*, Latreille.

*Plagusia* (part), Latreille, Gen. Crust. et Ins. p. 33 (1806): Desmarest, Consid. Gen. Crust. p. 126 (part): De Haan, Faun. Japon. Crust. p. 31: Milne Edwards (part), Hist. Nat. Crust. II. 90, and Ann. Sci. Nat. Zool., (3) XX. 1853, p. 178: Miers, Ann. Mag. Nat. Hist. (5) I. 1878, p. 143, and Challenger Brachyura, p. 271: Kingsley, Proc. Ac. Nat. Sci. Philad., 1880, pp. 189, 323.

*Philyra*, De Haan, l.c. *supra*.

Carapace subcircular, depressed, the antero-lateral borders toothed. The interorbital space is broad, being nearly a third the greatest breadth of the carapace; but there is no true front, so that the antennular fossæ, into which the antennules fold nearly vertically, are visible in a dorsal view as deep clefts in the anterior border of the carapace. The interantennular septum is broad. Orbits deep: the antehum stand in the wide orbital hiatus, their flagellum is short.

Epistome short: buccal cavern squarish, its anterior border is crenate and projects strongly in a horizontal direction. The external maxillipeds do not meet across the buccal cavern, but the space between them, which is not very broad, is occluded by bristles: their merus is as broad as the ischium and carries the palp at its summit: *their exognath has no flagellum.*

Chelipeds and legs dorsally rugose. Chelipeds subequal: in the male they are more massive than the legs, and longer than those of the first and last pairs, in the female they are shorter and slenderer than any of the legs: the fingers are stout and have rounded hollowed-out tips.

Legs very stout, with broad massive meri and short stout serrated dactyli.

The abdomen of the male is triangular and rather broad: it covers all the sternum between the last pair of legs, and it may have all 7 segments distinct or the 3rd 4th and 5th fused. In the female the abdomen is broad and consists of 7 segments, but the 3rd 4th and 5th do not move independently of one another.

*Distribution*: all warm seas, and extending into the Mediterranean.

In habit the *Plagusie* to a certain extent resemble the *Grapsi*, dodging about rocks that are awash at high tide, and hiding in crannies when pursued. They also resemble *Varuna* in being able to make themselves at home on drift timber in the open sea. This will account for the very wide range of some of the species.

The presence of two species in the Mediterranean implies nothing, of itself, for they may very probably have been carried there by ships. On the "Investigator" one could always see a *Plagusia* adhering to the ship's side near the water-line.

#### 124. *Plagusia depressa* var. *squamosa* (Hbst.).

? *Cancer depressus*, Herbst (nec Fabr.), Krabben &c. I. ii. 117, pl. iii. figs. 35 a-b.

*Cancer squamosus*, Herbst, I. ii. 260, pl. xx. fig. 113 (v. Hilgendorf, SB. Ges. Nat. Freunde, 1882, p. 24).

*Plagusia squamosa*, Latreille, Gen. Crust. p. 34, and Nouv. Diet. Hist. Nat. XXVI. p. 538, and (?) Encycl. Méthod. X. 1825, p. 145: Lamarck, Hist. Nat. Anim. Sans Verh. p. 246: Milne Edwards, Hist. Nat. Crust. II. 94: Krauss, Sudafr. Crust. p. 42: Milne Edwards, Ann. Sci. Nat., Zool., (3) XX. 1853, p. 178: Heller, SB. Akad. Wien, XLIII. 1861, p. 363, and Novara Crust. p. 51: A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 298: Richters, in Möbius, Meeresf. Maurit. p. 157: Hilgendorf, SB. Ges. Nat. Freunde, Berlin, 1882, p. 24.

*Plagusia tuberculata*, Lamarck, l. c. p. 247: Latreille, Encycl. Méthod. X. p. 146: Milne Edwards, l. c. p. 94: Miers, Ann. Mag. Nat. Hist. (5) I. 1878, p. 148: Haswell, Cat. Austral. Crust. p. 110: Müller, Verh. Ges. Basal, VIII. 1886, p. 476: de Man, Notes Leyden Mus. V. 1888, p. 168, and Zool. Jahrb., Syst., IX. 1895-97,

p. 358 : Ortmann, Zool. Jahrb., Syst., VII. 1893-94, p. 730 : M. J. Rathbun, P. U. S. Nat. Mus. XXI. 1898, p. 605.

*Plagusia immaculata*, Lamarck, l. c. p. 247 : Miers, l. c., p. 150, and Challenger Brachyura, p. 273, pl. xxii. fig. 1 : Haswell, l. c. : de Man, Archiv für Naturges. LIII. 1887, i. p. 371 : Cano, Boll. Soc. Nat. Napol. III. 1889, p. 246 : Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 391 : Ortmann, l. c. : Nobili, Ann. Mus. Genov. (2) XX. 1899, p. 271.

*Plagusia depressa*, Latreille (nec Fabr.), Encycl. Méth. X. 145 : Milne Edwards, Hist. Nat. Crust. II. 93, and Ann. Sci. Nat., Zool., (3) XX. 1853, p. 179 : Heller, Novara Crust. p. 51.

*Plagusia orientalis*, Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 103, and Ann. Lyc. Nat. Hist. New York, VII. 1860, p. 231.

All the regions of the carapace are distinct, and the surface is covered with flat pearly or squamiform tubercles which are fringed anteriorly with little close-set bristles of uniform length.

The tubercles vary: sometimes they are prominent, sometimes depressed, and sometimes they are almost obsolete on the most convex portions of the carapace. The little fringes of bristles also vary: sometimes they fill all the space between the tubercles, sometimes they can only be made out with a lens, sometimes they are absent.

The antero-lateral border of the carapace is armed with four teeth (including the orbital angle) which decrease in size from before backwards. The epistome is prominent beyond the anterior border of the carapace and is usually cut into seven lobes.

The chelipeds of the adult male are massive and are about half again as long as the carapace, but in the female they are slender and only about as long as the carapace. The inner angle of the wrist is coarsely dentiform: the tubercles on the upper surface of the palm and dactylus are arranged in high relief in longitudinal rows, those on the outer surface of the palm—especially at the upper part of it—have a tendency to fall into transverse rows.

On the posterior edge of the dorsal surface of the basipodites of the legs is a subacute tooth or blunt lobe with entire edges, this tooth being most conspicuous in the 2nd and 3rd pair of legs: on the anterior border of the meropodites there is a single strong spine, subterminal in position: the upper surface of the carpopodites propodites and dactyli is traversed longitudinally by a dense strip of long bristles. The 3rd pair of legs, which are the longest, are not quite twice the length of the carapace.

In the Indian Museum are 31 specimens from the Bay of Bengal and Arabian Sea: many of them were taken from drift timber in the open sea. Old specimens are commonly encrusted with barnacles and acorn-shells. The largest specimen in the collection has a carapace 54 millim. long and 56 broad.

## LIOLOPHUS, Miers.

• *Leioloophus*, Miers, Cat. Crust. New Zealand, p. 46 (1876), and Ann. Mag. Nat. Hist. (5) I. 1878, p. 153.

*Acanthopus*, De Haan, Faun. Japon. Crust. p. 29: Dana, U.S. Expl. Exp. Crust. pt. I. p. 372: Milne Edwards, Ann. Sci. Nat., Zool., (3) XX. 1853, p. 180 (*nom. præocc.*).

As in *Plagusia*, the antennæ fold nearly vertically in deep slits—visible in a dorsal view—cut in the anterior border of the carapace, the slits dividing the interorbital space into three deep lobes; and the exognath of the external maxillipeds has no flagellum.

The difference from *Plagusia* is as follows:—

The carapace is extremely flat and depressed—being quite disk-like—and is longer than broad: the interantennular septum is of no great breadth: the epistome is almost linear: the merus of the external maxillipeds is very small, being much narrower than the ischium, and is disposed obliquely in repose: the chelipeds and legs, though in places spiny, are not rugose: the legs are much slenderer, and though the meropodites are broad they are very thin: the copulatory organ of the male ends in a claw: finally, the exognath of the external maxillipeds is extremely short and slender.

As in the Indian species of *Plagusia*, the abdomen of the male consists of 5 segments, the 3rd 4th and 5th being fused. The abdomen of the female is similar in this respect to that of the male,

*Distribution*: as *Plagusia*, but not in the Mediterranean.

125. *Lioloophus planissimus* (Hbst.).

*Cancer planipes*, Seba, Thesaurus III. p. 49, pl. xix. fig. 21 (1758).

*Cancer planissimus*, Herbst, Krabben &c. III. iv. 3, pl. lix. fig. 3 (1804).

*Plagusia clavimana*, Latreille, Gen. Crust. p. 34: Lamarck, Hist. Nat. Anim. Sans Vert., Crust., p. 247: Desmarest, Dict. Sci. Nat. XXVIII. p. 246: Latreille, Encycl. Méthod. X. p. 146: Desmarest, Consid. Gen. Crust. p. 127, pl. xiv. fig. 2: Milne Edwards, Hist. Nat. Crust. II. 92, and in Cuvier, Règne Animal, Crust. pl. xxiii. fig. 3: Hess, Archiv f. Nat. XXXI. 1865, i. p. 154: Desbonne et Schramm, Crust. Guadalupe, p. 50: Richters in Möbius' Meeresf. Maurit. p. 157.

*Plagusia serripes*, Lamarck, loc. cit.: Latreille, Encycl. Méthod. loc. cit.

*Acanthopus planissimus*, De Haan, Faun. Japon. Crust. p. 30: Dana, U. S. Expl. Exp. Crust. pt. I. p. 372: Milne Edwards, Ann. Sci. Nat., Zool., (3) XX. p. 180: Heller, SB. Ak. Wien, XLIII. 1861, p. 364: Stimpson, Ann. Lyc. Nat. Hist. New York, VII. 1862, p. 232: Heller, Novara Crust. p. 51: A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 299: Brocchi, Ann. Sci. Nat., Zool., (6) II. 1875, Art. 2 (*male appendages*): Nauck, Zeits. Wiss. Zool. XXXIV. 1880, p. 31 (*gastric teeth*).

*Acanthopus clavimanus*, Krass, Sudafr. Crust., p. 42.

*Acanthopus gibbesi*, Milne Edwards, Ann. Sci. Nat. Zool. loc. cit.

*Leioloophus planissimus*, Miers, Cat. Crust. N. Z. p. 46, and Ann. Mag. Nat. Hist. (5) I. 1878, p. 153, and P. Z. S. 1879, p. 38, and Zool. H. M. S. Alert, pp. 518, 545:

Filhol, Crust. N. Z., Miss. l'île Campbell, p. 894 : Haswell, Cat. Austral. Crust. p. 112 : Müller, Verh. Ges. Nat. Basel, 1886, p. 476 : de Man, Arch. f. Nat. LIII. 1887, i. p. 372, and Notes Leyden Mus. XV. 1893, p. 287, and Zool. Jahrb., Syst., IX. 1895-97, p. 358 : Pocock, Journ. Linn. Soc., Zool., XX. 1890, p. 513 : Henderson, Trans. Linn. Soc. Zool. (2) V. 1893, p. 391 : Ortmann, Zool. Jahrb., Syst., VII. 1893-94, p. 731 : Whitelegge, Mem. Austral. Mus. III. 1897, p. 139 : M. J. Rathbun, Ann. Inst. Jamaica, I. 1897, p. 36.

Carapace thin, disk-like, covered with little short bristles which, however, leave certain symmetrical raised linear patches bare : the meropodites of the legs are clad in the same way, and have two long bare stripes.

The front; the antennular and supra-orbital angles, and the epistome are all acutely spinous : the antero-lateral border of the carapace is armed with 4 acute spines : the middle of the upper border of the orbit is more or less serrate. The eyes are large and reniform.

The chelipeds vary according to age and sex, but the arm and wrist are always armed with spines ; the palm is smooth, nude, oval, and somewhat compressed ; and the fingers are short, blunt, and hollowed at tip. In the adult male the palms, or one of them, are remarkably deep.

The anterior border of the meropodites of all the legs is armed along its whole length with remarkably large and even spines, the posterior border ends in a spine : in the case of the first two meropodites there is a second row of spinules parallel with the anterior border, but this is very indistinct in the meropodites of the 3rd pair, and quite absent in those of the 4th.

The colour in life is dark green, the nude streaks being bright green. In the Indian Museum are 36 specimens from the Andamans, Ceylon, and Laccadives : the carapace of the largest is 23 millim. long and 21 broad.

## Family GEOCARCINIDÆ, Dana.

### *Key to the Indian Genera.*

- I. Fronto-orbital border more than half the maximum breadth of the carapace : interantennular septum broad : epistome well defined and prominent : dactyli of legs with 4 rows of spines :—

1. Buccal cavern not elongate : exognath of external maxillipeds without a flagellum : opposed edges of the basal joints of the 2nd and 3rd pairs of legs heavily fringed with hair much as in *Ocypoda* :—

- i. Antero-lateral borders of carapace dentate..... *GRABODES.*
- ii. Antero-lateral borders of carapace entire..... *EPIGRAPUS.*

2. Buccal cavern elongate: exognath of external maxillipeds with a flagellum: no hairy fringe on the basal joints of the 2nd and 3rd pairs of legs..... CARDIOBOMA.
- II. Fronto-orbital border less than half the greatest breadth of the carapace: interantennular septum narrow: epistome ill-defined and sunken: dactyli of legs with 6 rows of spines: exognath of external maxillipeds without a flagellum..... PELOCARCINUS.

### GRAPSODES, Heller.

*Grapsodes*, Heller, Novara Crust. p. 58: Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, pp. 188, 197.

Carapace depressed, little broader than long, declivous anteriorly, the regions faintly indicated, the dorsal surface without ridges or wrinkles, the lateral borders well arched and irregularly dentate.

Front about half the width of the anterior border, or about a third the greatest breadth of the carapace, strongly deflexed, its free edge nearly straight.

Orbits small, shallow, the lower border is wanting except for the tooth at the inner angle. The antennules fold nearly transversely in fossæ which are widely open externally: interantennular septum very broad. Antennal flagella slender and very short, standing in the orbital hiatus.

Epistome of moderate length fore and aft. External maxillipeds having a rhomboidal gap between them, in which the mandibles are visible: the merus is narrower than, but about the same length as, the ischium, and is a little oblique: the palp, which though coarse is small, articulates at the antero-external angle of the merus.

• Chelipeds in both sexes subequal: in the male they are very much more massive than the legs and longer than the first and last pairs: in the female they are relatively shorter and much less massive than in the male. The tips of the fingers are acute.

Legs stout, their joints are not particularly broad or compressed but have their edges armed with stout bristles: the dactyli are long, acute, and thorny. The 2nd and 3rd pair of legs are the longest, and between their bases is a recess fringed with hairs resembling that found in *Ocypoda* and *Gelasimus*, and probably indicating terrestrial or amphibious habits.

The abdomen in both sexes consists of seven segments, and in the male its base covers all the breadth of the sternum between the last pair of legs.

*Distribution*: Islands of East Indian Archipelago.



This genus is really identical with *Epigrapsus* (= *Nectograpsus*), from which it only differs in having the regions of the carapace even more indistinct, the lateral borders of the carapace entire, the male chelipeds remarkably unequal, and the dactylus of the legs alone hirsute.

126. *Grapsodes notatus*, Heller.

*Grapsodes notatus*, Heller, Novara Crust. p. 58, pl. v. fig. 2: Miers, P. Z. S. 1877, p. 136: J. S. Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, p. 197: de Man, Notes Leyden Mus. V. 1883, p. 160.

Carapace five-sixths as long as broad, the regions defined, though faintly, the surface smooth except sometimes for some granules near the lateral borders. The antero-lateral borders are cut into three shallow teeth or lobes behind which are some inconspicuous crenulations. On the line of flexion of the front are two eminences separated by a notch. Epistome and pterygostomian regions tomentose.

The chelipeds differ considerably in the sexes, though always smooth. In the adult male they are nearly twice the length of the carapace, the inner angle of the wrist is pronounced but not spiniform, the palm (which is as high as long) has a strong bulge at the infero-posterior angle, the dactylus (which is twice as long as the upper border of the palm) is much longer than the immobile finger and closes very obliquely, and there are two molariform teeth, one near the base of the dactylus, the other nearer the tip of the immobile finger.

In the female the chelipeds are hardly  $1\frac{1}{2}$  times the length of the carapace, the inner angle of the wrist is dentiform or spiniform, the palm is not enlarged or inflated, and the fingers are of nearly equal length, meet in the greater part of their extent, and are finely denticulated except near the tips.

The second pair of legs, which are the longest, are about twice the length of the carapace, the third pair are a little shorter than the second, and the first and last pair are about  $1\frac{1}{2}$  times the length of the carapace.

In the Indian Museum are 8 specimens from the Nicobars. The carapace of the largest male is 25 millim. long and 30 millim. broad, but a female is somewhat larger than this.

That this species is probably terrestrial is evidenced by the vaulted branchial cavities, and also by the folding of the membrane that lines them, which is practically the same as that of *Ocypoda*, *Cardisoma*, and *Pelocarcinus*.

## EPIGRAPSUS, Heller.

• *Epigrapsus*, Heller, Verh. zool.-bot. Ges. Wien, XII. 1862, p. 522: Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, pp. 188, 192: Miers "Challenger" Brachyura, p. 265.

*Nectograpsus*, Heller, Novara Crust. p. 56.

This genus is really identical with *Grapsodes*, from which it differs in no single point of importance.

The trivial characters that separate it from *Grapsodes* are the following:—

The regions of the carapace are hardly distinguishable, and the lateral margins are entire: the chelipeds in the male are markedly unequal, one of them being longer and vastly more massive than the legs, the other being hardly larger than those of the female (which resemble those of *Grapsodes*): though the legs resemble those of *Grapsodes* in proportions and in the singular length of the dactyli, they differ in having only the terminal joint hirsute.

*Distribution*: Islands of the East Indian Archipelago and Polynesia.

127. *Epigrapsus politus*, Heller.

*Epigrapsus politus*, Heller, Verh. zool.-bot. Ges. Wien, XII. 1862, p. 522: Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, p. 192: Miers, Challenger Brachyura, p. 266: Ortmann, Zool. Jahrb., Syst., VII. 1893-94, p. 703: de Man, Zool. Jahrb. Syst. IX. 1895-97, p. 79.

*Nectograpsus politus*, Heller, Novara Crust. p. 57, pl. v. fig. 3.

Carapace about seven-eighths as long as broad, perfectly smooth, the outer orbital angle not pronounced and the lateral margins entire in the adult. The line of flexion of the front is a little concave in the middle. Epistome and pterygostomian regions tomentose.

Chelipeds smooth, equal in the female, markedly unequal in the male. In the male the larger cheliped is more than twice the length of the carapace, the inner angle of the wrist is not pronounced, the palm is about as high as long and has a strong bulge at its postero-inferior angle, the dactylus is much longer than the immobile finger, and the dactylus has 2 or 3 small molariform teeth while the immobile finger has a single one.

In the female the chelipeds are little longer than the carapace, have the inner angle of the wrist pronounced, the palm not enlarged or inflated, and the fingers finely and inconspicuously toothed and nearly equal in length.

The smaller cheliped of the male is but little larger than those of the female.

Of the legs the 2nd pair are the longest, being twice the length of the carapace, and the 3rd pair are slightly shorter: the 1st pair are nearly  $1\frac{1}{2}$  times, the 4th pair about  $1\frac{1}{3}$  times the length of the carapace.

In the Indian Museum are 4 specimens, from the Andamans and Nicobars: the carapace of the largest male is 14 millim. long and 16 millim. broad.

#### CARDIOSOMA, Latreille.

*Cardisoma*, Latreille, Encycl. Méthod. X. p. 685 (1825): De Haan, Fann. Japon. Crust. p. 27: Milne Edwards, Hist. Nat. Crust. II. 22, and Ann. Sci. Nat. Zool. (3) XX. 1853, p. 203: Smith, Trans. Connect. Acad. Sci. II. 1870, p. 142: Miers, Challenger Brachyura, p. 219: Ortmann, Zool. Jahrb., Syst., VII. 1893-94, p. 732.

? *Discoplas*, A. Milne Edwards, Ann. Soc. Entom. France, (4) VII. 1867, p. 248, and Nouv. Archiv. du Mus. IX. 1873, p. 293.

Carapace deep, convex fore and aft, transversely oval, with the lateral borders tumid and strongly arched owing to the vault-like expansion of the gill-chambers, the pterygostomian regions densely tomentose.

The fronto-orbital border is much more than half, and the deflexed and nearly straight front is about a fourth, the greatest breadth of the carapace. Orbits deep, with the outer angle defined by a denticle, and with the tooth at the inner angle well developed but distant from the front: the eyes are very loose in the orbits.

The antennules fold obliquely beneath the front, by which they are a good deal concealed: the inter-antennular septum is very broad. The antennæ lie in the orbital hiatus, which their broad basal joint nearly fills: their flagellum is very short.

Epistome short, prominent and well defined: buccal cavern elongate squarish, the external maxillipeds do not close it but leave between them a rhomboidal gap in which the mandibles are exposed. In the external maxillipeds the merus is a longish joint and carries the palp, which is large and not at all concealed, at its antero-external angle: the exognath, which carries a flagellum, is exposed in much the greater part of its extent. The exognaths of the other maxillipeds are heavily fringed with coarse hair.

The chelipeds, which are much more massive than the legs, may either be equal or markedly unequal, differing little in the sexes: they alter considerably with age—one or both—the arm and fingers becoming elongated, and the whole hand increasing in size until it becomes longer than the carapace is broad and more than half as high as the carapace is long.

The legs are stout: some of their joints are fringed with bristles, and

their long strong dactyli are square in section and have a series of spines along all four edges.

The abdomen in both sexes consists of 7 separate segments, and in the male its base covers the whole width of the sternum between the last pair of legs.

The branchiæ are eight in number on either side: the gill chambers are vaulted and remarkably capacious, and they are lined by a thick vascular membrane folded to form a sort of pocket, and as in several other crabs—such as *Gelasimus* and *Ocypoda*—that spend most of their time out of water, a sort of “choroid process” of this membrane, shaped like a gill-plume, projects laterally over the pleura of the penultimate pair of legs.

The species of this genus live on land. They are very common in the jungles of the Andamans where they may be found in the day time crouching under roots, fallen logs, &c., sometimes in burrows near the shore.

*Distribution:* West Indies and neighbouring coasts of America, Cape Verde Is. and West Coast of Africa, Indo-Pacific from Madagascar to Chili.

#### *Key to the Indian species of Cardiosoma.*

- I. Carapace very strongly convex fore and aft, the regions indistinct: breadth of the orbit not much more than half its length: merus of the legs with bristles only at its distal end..... *C. carnifex*.
- II. Carapace very moderately convex fore and aft, the regions distinct: breadth of the orbit about two-thirds its length: merus of the legs with bristles along its whole length..... *C. hirtipes*.

#### 128. *Cardiosoma carnifex*, (Hbst.).

*Cancer carnifex* and *hydromus*, Herbst, Krabben etc. II. v. 163, 164, pl. xli. figs. 1, 2 (1794).

*Cardiosoma carnifex*, Latreille, Encycl. Méthod. X. p. 685: Milne Edwards, Hist. Nat. Crust. II. 23: Guérin, Icon. Règne An., Crust. pl. v. fig. 2: Dana, U. S. Expl. Exp. Crust. pt. I. p. 377: Milne Edwards, Ann. Sci. Nat. Zool. (3) XX. 1853, p. 204: Heller, Novara Crust. p. 35: A. Milne Edwards, Nouv. Archiv. du Mus. IV. 1868, p. 71, and IX. 1873, p. 264: Hoffmann, in Pollen and van Dam, Faun. Madagasc., Crust. p. 12: Broochi, Ann. Sci. Nat., Zool., (6) II. 1875, Art. 2, p. 85, pl. xvii. figs. 117, 118 (*male appendages*): Miers, P. Z. S. 1877, p. 137, and Phil. Trans. 1879, p. 490, and Challenger Brachyura, p. 220: Hilgendorf, MB. Ak. Berl. 1878, p. 801: de Man, Notes Leyden Mus. II. 1880, p. 31, and in Weber's Zool. Ergebn. Niederl. Ost-Ind. II. p. 285: Richters, in Möbius, Meeresf. Maurit. p. 167: Lenz and Richters, Abh. Senck. Nat. Ges. XII. 1881, p. 422: Taschenberg, Zeitschr. f.

Naturwiss. LVI. 1883, p. 171: Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 380: Nobili, Ann. Mus. Genov. (2) XX. 1899, p. 271.

*Cardisoma Guanhumi* var. *carnifex*, Ortmaun, Zool. Jahrb., Syst., VII. 1893-94, p. 785.

*Cardisoma obesum*, Dana, Proc. Ac. Nat. Sci. Philad. V. 1851, p. 252, and U. S. Expl. Exp. Crust. pt. I. p. 375, pl. xxiv. fig. 1: Milne Edwards, Ann. Sci. Nat., t.c. p. 205: Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 100: Streets, Bull. U. S. Nat. Mus. VII. 1877, p. 114: P de Man, Notes Leyden Mus. II. 1880, p. 35.

*Cardisoma Urvillei*, Milne Edwards, Ann. Sci. Nat. t.c. p. 204: de Man, Notes Leyden Mus. t.c., p. 33.

Carapace strongly convex fore and aft, especially in the young, the regions are indicated by inequalities of level, but the posterior limit of the gastric region and the cardiaco-intestinal region are defined by grooves: the posterior areola of the gastric region is always tumid.

The antero-lateral border of the carapace is defined by a fine raised line, becoming indistinct with age, which is not continuous with the small tooth at the outer orbital angle, but starts at a little denticle of its own.

The sides of the front (inner boundaries of the orbit) are very oblique: the sinuous upper border of the orbit runs very slightly backward to the base of the outer orbital tooth: the greatest width (height) of the orbit is little more than half the length of that cavity. The basal antenna-joint is large, touching the front.

The breadth of the buccal cavern, measured across the middle of the external maxillipeds, is equal to its length in the middle line.

In both sexes the chelipeds are unequal: they are smooth, except for a few small tubercles or wrinkles or denticles or granules along the edges of some of the joints: the inner angle of the wrist is dentiform, the palm is higher than long, especially in the larger hand, the stout fingers meet only at tip, especially in the larger hand.

The size of the larger obeliped varies with age. In adults of moderate size it is about twice the length of the carapace, the ischium hardly projects beyond the carapace, and the length of the dactylus is about equal to the height of the palm. In old specimens, especially in the male sex, it is about  $2\frac{1}{2}$  times the length of the carapace, the ischium projects far beyond the carapace, and the length of the dactylus is  $1\frac{1}{2}$  times the height of the palm.

In the legs there are stiff bristles, not very thickly set, at the distal end of the merus, on the anterior border and surface of the carpus and on both borders of the propodite.

The 7th segment of the male abdomen is half or less than half the length of the 6th, measured in the middle line.

In the Indian Museum there are 13 specimens from the Andamans and the Coromandel coast (besides specimens from Tahiti and Madagascar).

Ortmann considers that this form is only a variety of the West Indian *O. Guanhumi*, with which he regards the West African *O. armatum* as synonymous. So far as I can judge from single specimens of these two supposed species, I should think that this view is correct.

### 129. *Cardiosoma hirtipes*, Dana.

*Cardiosoma hirtipes*, Dana, Proc. Ac. Nat. Sci. Philad. 1851, p. 253, and U. S. Expl. Exp. Crust. pt. I. p. 376, pl. xxiv. figs. 2, *a-d*: Milne Edwards, Ann. Sci. Nat., Zool., (3) XX. 1853, p. 205: Hess, Archiv f. Naturges. XXXI. 1865, i. p. 140: Heller, Novara Crust. p. 35: Miers, Cat. Crust. New Zealand, p. 53: de Man, Notes Leyden Mus. II. 1890, p. 34, and Archiv f. Naturges. LIII. 1887, i. p. 349, pl. xiv. fig. 3: E. Nauck, Zeits. Wiss. Zool. XXXIV. 1880, p. 26 (*gastric teeth*): Filhol, Crust. N. Z. in Miss. l'île Campbell, p. 460: Ortmann, Zool. Jahrb., Syst., VII. 1893-94, p. 737: Whitelegge, Mem. Austral. Mus. III. 1897, p. 138: Nobili, Ann. Mus. Genov. (2) XX. 1899, p. 271.

*Discoplax longipes*, A. Milne Edwards, Ann. Soc. Entomol. France, (4) VII. 1867, p. 284, and Nouv. Archiv. du Mus. IX. 1873, p. 294, pl. xv. (*sec* Ortmann, *l.c.*).

This species is easily distinguished from *O. carnifex* by the following characters:—

(1) the carapace is much less convex, the regions are much more distinctly defined, and the gastric region is distinctly subdivided, by grooves, into 3 areolæ: moreover there are some fine oblique striæ on the sides of the epibranchial regions:

(2) the sides of the front, or inner boundaries of the orbit, are not nearly so oblique: the upper border of the orbit is less sinuous and runs slightly forwards to the outer orbital angle: the greatest width of the orbit is nearly two-thirds the length of that cavity. The basal antenna joint does not touch the front:

(3) the breadth of the buccal cavern, measured across the middle of the meri of the external maxillipeds, falls considerably short of the length measured in the middle line:

(4) the chelipeds may be unequal but are far more commonly equal, even in old specimens in which the palms and fingers have grown long and the palm become enlarged:

(5) the bristles on the legs are more thickly set, and they occur along the whole of the anterior border of the merus:

(6) the 7th segment of the male abdomen is more than half the length of the 6th, measured in the middle line.

\* In the Indian Museum are 18 specimens from the Nicobars and Andamans (besides 4 from the "South Seas" and Madagascar).

In life the carapace is dark violet and the chelæ bright cinnabar red.

#### PELOCARCINUS, Edw.

*Gecarcoidea*, Milne Edwards, Hist. Nat. Crust. II. 25 (1837).

*Pelocarcinus*, Milne Edwards, Ann. Sci. Nat. Zool. (3) XX. 1853, p. 203, and Archiv. du Mus. VII. 1854-55, p. 183: A. Milne Edwards, Nonv. Archiv. du Mus. (3) II. 1890, p. 171 (*et synonym.*).

*Hylæocarcinus*, Wood-Mason, J.A.S.B. XLII. 1873, pt. 2, p. 258, and Ann. Mag. Nat. Hist. (4) XIV. 1874, p. 189.

*Limnocarcinus*, de Man, Notes Leyden Mus. I. 1879, p. 65.

*Gecarcoidea*, Ortmann, Zool. Jahrb., Syst., VII. 1893-94, pp. 732, 738.

Carapace transversely oval, somewhat depressed, with the lateral borders tumid and strongly arched owing to the vault-like expansion of the gill-chambers: the gastric region particularly well defined.

The extent of the fronto-orbital border is less than half the greatest breadth of the carapace, that of the strongly deflexed and nearly straight front is from a sixth to a seventh the greatest breadth of the carapace.

Orbits deep, broadly oval, demarcated dorsally by a sharpish slightly raised border, their outer angle not defined, a wide gap in their lower border: at the inner angle there is a strong tooth which may or may not, even in the same species from the same jungle, meet the front: if it does so, the antennæ, which are much reduced in size, are excluded from the orbit.

The antennules fold obliquely beneath the front, and the inter-antennular septum is not very broad.

Epistome sunken, hairy posteriorly so as to appear ill defined from the palate. Buccal cavern rounded anteriorly, not nearly closed by the external maxillipeds, which leave between them a wide rhomboidal gap in which the mandibles are exposed.

The external maxillipeds are rather short: their merus lies obliquely, and its anterior edge is excavated for the insertion of the palp, which is short and coarse and is completely exposed: their exognath is very short and almost entirely concealed and is without a flagellum. The exognaths of the other maxillipeds are heavily fringed with hair.

Chelipeds much more massive than the legs, usually equal in both sexes, though larger and longer in the male than in the female.

Legs stout: in all, the anterior border of the carpus and all the borders of the propodite and dactylus are spiny, there being six rows of spines on the dactylus.

The abdomen in both sexes consists of 7 separate segments, and in the male its base covers all the breadth of the sternum between the last pair of legs.

The gill-chamber and its lining membrane, and the number of branchiæ, are as in *Cardiosoma*.

The *Pelocarcini* are land-crabs. The single Indian species is very common in the jungles of the Andamans, where, especially on the smaller islets, it grows to a large size.

*Distribution*: Brazil, Andamans and Nicobars, Celebes, Philippines, New Guinea, Loyalty Is.

Ortmann (*l.c.*) throws doubt on the locality Brazil, but, as it appears to me, without sufficient reason, seeing that the elder Milne Edwards states definitely that the type of the species was found in that country by a collector of the Paris Museum. *Pelocarcinus* is by no means the only form of animal life that has this very curious and suggestive distribution, which we also find, among Mammals in the Tapirs, among Birds, as Mr. Finn informs me, in the Piculets of the genus *Picumnus*, among Reptiles in the *Ilysiidæ*, and among fishes in the freshwater eels of the genus *Symbranchus*.

### 130. *Pelocarcinus Humei* (Wood-Mason).

*Hylæocarcinus Humei*, Wood-Mason, Journ. As. Soc. Bengal, Vol. XLII. 1873, pt. 2, p. 260, pls. xv, xvi, and Ann. Mag. Nat. Hist. (4) XIV. 1874, p. 190.

Carapace transversely oval, becoming broader with age, its lateral borders tumid and ill defined. The gastric region is particularly well delimited and is divided into three subregions—two antero-lateral and one postero-median—the anterior two of which are separated from one another by a deep groove: the cardiac-intestinal region is fairly well defined.

In adults the carapace is smooth, except for some oblique striæ on the lateral borders, which become squamiform markings on the pterygostomian regions, these regions being devoid of tomentum.

Front nearly vertically deflexed, somewhat spatulate but with the free edge straight. The tooth at the inner angle of the orbit does not usually touch the front, but sometimes it does and excludes the small antennæ from the orbit.

The chelipeds in the adult male are usually equal and are about  $2\frac{1}{2}$  times the length of the carapace: the arm projects a long way beyond the carapace, and its upper and inner borders are rugose or irregularly tuberculate; the inner angle of the wrist is truncated; the palm is enlarged, its length is about  $1\frac{1}{2}$  times its height and about as long as the



dactylus; the fingers, though they only meet at tip, are not widely separated.

In the adult female the chelipeds are about  $1\frac{1}{2}$  times the length of the carapace: the arm projects but little, the hand is not much enlarged, and the fingers almost meet throughout their length.

In many young females the inner edge of the wrist is serrated and there are also a few denticles along the upper border of the palm.

The second pair of legs, which are the longest, are hardly twice the length of the carapace.

Colours in life: carapace violet with some dirty yellow markings: chelipeds and legs yellowish with a livid reddish tinge.

In the Indian Museum are specimens from the Nicobars and from numerous islands of the Andaman group. The largest one has a carapace 82 millim. long and 110 broad.

### Family PALICIDÆ, Rathbun.

#### PALICUS, Philippi.

*Cymopolia*, Roux, Crust. Médit. pl. xxi. 1828: Milne Edwards, Hist. Nat. Crust. II. 158: Miers, Challenger Brachyura, p. 383 (*nom. præocc.*).

*Palicus*, Mary J. Rathbun, Proc. Biol. Soc., Washington, XI, 1897, pp. 93, 165 ["Philippi, Zweiter Jahresber. d. Vereins f. Naturk. in Cassel, 11, 1838."].

Carapace depressed, broader than long, covered with granules and with symmetrical tubercles or rugosities that have a tendency to fall into transverse series.

Front about a third the greatest breadth of the carapace, little or not at all deflexed, usually lobed or toothed. Lateral borders of the carapace hardly curved, serrated anteriorly.

Orbits deep, the upper border is cut into several teeth by deep clefts, and there are usually two clefts in the lower border.

The antennules fold nearly transversely beneath the front: the interantennular septum is a narrow plate. The antennæ commonly have the basal joint, which stands in the orbital hiatus, enlarged: the flagellum is well developed.

Epistome sunken, not defined. Buccal cavern square. The external maxillipeds do not close the buccal cavern anteriorly: their merus is very small and is much narrower than the ischium: the ischium has its antero-internal angle and the merus its antero-external angle much produced: the palp articulates near the middle of the concave summit of the obliquely-placed merus.

Chelipeds short and usually slender in the female: in the adult male one of them may be enlarged—rarely both.

The two middle pairs of legs are much the largest: the first pair, except that they are much shorter and slenderer, resemble the middle pairs, but the fourth pair are weak, sometimes filiform, and are elevated above the third pair as in *Dorippe*, etc.

The abdomen in both sexes consists of 7 separate segments, the basal segments being very narrow fore and aft and the 1st linear.

In the female the genital openings are on the 2nd segment of the sternum close to the suture between it and the first.

*Distribution*: Atlantic coasts of Central America and of the United States, Cape Verde and Mediterranean, Indo-Pacific from Seychelles to California.

The Indian species of *Palicus* live among coral shingle at a depth of from 10 to 40 fathoms, where their mottled coloration and granular rugose carapace afford a good concealment.

### Key to the Indian species of *Palicus*.

#### I. Posterior border of the propodites and dactyli of the first 3 pairs of legs entire:—

##### 1. Front cut into two lobes:—

- i. Lobes of front broad: propodites and dactyli of the two middle pairs of legs sub-foliaceous ..... *P. Jukesii*.
- ii. Lobes of front subacute: propodites and dactyli of the two middle pairs of legs compressed but not broadened ..... *P. Whitei*.

##### 2. Front cut into four lobes, the middle two sub-acute, the outer ones broad ..... *P. Wood-Masoni*.

#### II. Posterior border of the propodites and dactyli of the first 3 pairs of legs elegantly serrate:—

##### 1. Front cut into four blunt teeth: propodites and dactyli of the two middle pairs of legs broadly foliaceous ..... *P. serripes*.

##### 2. Front cut into four acute teeth: propodites and dactyli of the two middle pairs of legs compressed but not foliaceous ..... *P. investigatoris*.

### 131. *Palicus Jukesii* (White).

*Cymopolia Jukesii*, White, in Jukes' Voy. H. M. S. "Fly," p. 338, pl. ii. fig. 1: Miers Zool. H. M. S. "Erebus" and "Terror," Crust. p. 3, pl. iii. figs. 4-4c, and Challenger Brachyura, p. 335: Haswell, Cat. Austral. Crust. p. 138: Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 405.

Carapace with the regions well defined, and with the surface thrown into four transverse wrinkles, the two middle ones of which are the most convex and best defined: the whole surface is also closely

covered with vesiculous and crystalline granules, which are largest on the convexities.

Front divided into two broad rounded lobes: antero-lateral border of the carapace cut into three teeth including the orbital angle: posterior border of the carapace raised, but not cut into well-spaced lobules.

Upper border of the orbit with two deep notches between the inner and outer orbital angles, both of these angles having a concave margin: lower border with two deep notches. There is a leaf-like lobule on the granular eye-stalk, another at the outer angle of the basal antenna-joint, and another in the gap between the antenna and the outer angle of the buccal cavern. The exposed surface of the ischium of the external maxillipeds is obliquely traversed by two ridges which meet at the produced antero-internal angle of the joint.

The chelipeds of the *adult* male are granular and downy and are usually markedly unequal. The larger one is stout, is more than  $1\frac{1}{2}$  times the length of the carapace and has a swollen (subcylindrical) club-shaped palm of which the length is not twice the greatest height: the fingers are short and stumpy, the dactylus being little more than a third the length of the palm, and most only at tip: the smaller cheliped of the male is short and slender, sometimes however it is almost as large as its fellow.

In the female the chelipeds are equal, are hardly longer than the carapace and hardly stouter than the last pair of legs: they have a palm which is as slender and nearly as long as the ischium, and incurved fingers which nearly meet throughout their length.

In the first 3 pairs of legs the merus is stout and broad with a granular dorsal surface and coarsely and unevenly serrulate edges, the anterior edge ending in a crest-like tooth; the carpus is dorsally carinate, and its anterior border has the form of a two-lobed carina; and the propodite and dactylus are subfoliaceous owing to the depth of the thin sharp carinæ of their edges—these carinæ being plumed. The 4th pair of legs are short weak and granular as far as the dactylus, which is much shorter than the propodite.

The 1st pair of legs are a little longer, the 4th pair a little shorter, than the carapace: the 2nd and 3rd pairs are about  $1\frac{1}{2}$  times the length of the carapace.

In both sexes all the abdominal terga, except the last, are transversely carinate, the carinæ of the 2nd and 3rd terga being most conspicuous. Also on either side of the sternum there are two crests, one behind the base of the last pair of legs, the other almost in a line with the 3rd abdominal carina.

In the Indian Museum are 32 specimens, from the Andamans (up to 36 fath.), the Maldives (15-30 fath.), and Ceylon (34 fath.). The carapace of the largest female is 13 millim. long and 15 broad.

132. *Palicus Whitei* (Miers).

*Cymopolia Whitei*, Miers, Zool. H. M. S. "Alert," pp. 518, 551, pl. xlix. fig. C.

At once distinguished from *P. Jukesii*, which it closely resembles, by the sharper and more prominent lobes of the front, and by the slenderer form of the first 3 pairs of legs, in which the edges of the meri are not serrated, the anterior borders of the carpi are not cristiform, and the propodites and dactyli are not in any way subfoliaceous, their edges not being produced to form high thin carinæ.

Other differences, to be noted on closer inspection, are the following:—

The transverse arrangement of the rugæ of the carapace is not marked: the faint transverse carinæ of the 5th and 6th abdominal terga are absent.

In the Indian Museum are 2 adult females and a non-adult female, from the Andamans.

133. *Palicus Wood-Masoni*, n. sp.

Carapace with the regions distinct and areolated in high relief: except posteriorly, the areolæ have no tendency to arrange themselves transversely: the convexities of the areolæ, but not the interspaces, bear clumps of crystalline granules.

Front cut into 4 teeth, the middle pair narrower, slightly more prominent, and on a rather lower plane than the others: lateral border of the carapace cut into three teeth, including the very large and acute orbital angle: posterior border raised and irregularly lobulate.

In the upper border of the orbit there are three deep notches, in the lower border a notch and a fissure.

There is only one cheliped in the single specimen known: it is short, not stouter than the legs, and has some blunt denticles on the far end of the arm, on the wrist, and on the upper surface of the hand.

In the first 3 pairs of legs the meri are stout and have a granular dorsal surface and coarsely serrulate edges, the anterior edge ending in a coarse spine; the carpi are dorsally carinate, and their anterior edge has the form of a two-lobed crest; while the propodites and dactyli are elongate and compressed with thin, but not cristiform, plumed edges. The filamentous 4th pair are granular up to the dactylus, which is not much shorter than the propodite.

The 1st pair of legs are about  $1\frac{1}{2}$  times, the 2nd and 3rd pairs are about  $2\frac{1}{4}$  times, the length of the carapace, while the 4th pair are about as long as the carapace.

In the male (female unknown) the first 5 abdominal terga are transversely carinated, but the 4th and 5th carinæ are faint. The sternum is also carinated on either side of the abdomen, as in *P. Jukesii*, but the crests are much lower.

In the Indian Museum is a single male specimen from the Andamans: its carapace is 9 millim. long and 11 broad.

134. *Palicus serripes*, Alcock & Anderson.

*Cymopolia serripes*, Alcock & Anderson, Journ. As. Soc. Bengal, Vol. LXIII. pt. 2, 1894, p. 208: Illustrations of the Zoology of the Investigator, Crust. pl. xxiv. fig. 7.

Carapace with the regions well defined and cut up into a multitude of symmetrical convex areolæ, its whole surface is covered with crystalline granules which are enlarged on the convexities of some of the areolæ.

Front cut into 4 teeth, the middle two of which, though deflexed and on a lower plane, are much sharper and more prominent than the others: lateral borders of the carapace posteriorly divergent, cut into five ragged teeth, inclusive of the orbital angle: posterior border cut into from eight to ten well spaced even tooth-like lobes.

Upper border of orbit with 3 deep notches, lower border with a notch and a fissure: eyestalks sharply granular. Ischium of the external maxillipeds longitudinally grooved.

The chelipeds of the female (male unknown) though shorter than the carapace are stouter than the first pair of legs: they may be subequal or unequal: the arm, wrist, and the upper surface of the palm are sharply granular, the palm is rather full and is not elongate, being about half again as long as high and less than half again as long as the fingers.

The 1st pair of legs are about as long as the carapace: their merus is sharply granular and its anterior border ends in a spine: their propodite and dactylus are thin and compressed but not broadened, and their posterior border is evenly serrated.

The 2nd and 3rd pair of legs are a little over  $1\frac{1}{2}$  times the length of the carapace: their merus is very stout and broad, with a granular dorsal surface and sharply though irregularly serrated edges: their carpus has the anterior border cristiform and irregularly serrate, and the posterior border subcristiform up to a terminal spine: their propodite and dactylus are short and broadly foliaceous, with the posterior

border elegantly and evenly serrated and the anterior border fringed with long hair.

The 4th pair are filiform, not nearly as long as the carapace, and are granular up to the dactylus which is slightly longer than the propodite.

In the female the first 3 abdominal terga are transversely carinate: the carina of the first tergum, which alone is prominent, ends off in a sort of scroll, which flanks the postero-lateral angles of the carapace.

In the Indian Museum are 9 specimens, all adult females, from off the Madras coast in the neighbourhood of Palk Strait and from off Ceylon 34 fathoms. The carapace of the largest is 9.5 millim. long and 11 broad.

135. *Palicus investigatoris*, n. sp.

This species is closely related to *P. serripes*, but differs in the following characters:—

The areolæ of the carapace are capped, not by clusters of granules, but by sharp little tubercles between which the surface is smooth: except on the lateral regions of the carapace there is only one such tubercle to each areola:

(1) the four teeth of the front are all equally acute: the five teeth of the lateral borders of the carapace, though irregular in size, are all very sharp and clean cut: the teeth of the posterior border are smaller and sharper:

(2) there is no fissure towards the inner end of the lower border of the orbit:

(3) there are denticles or sharp tubercles, instead of granules, on the arm, wrist, and upper surface of the hand:

(4) the legs only differ in the case of the 2nd and 3rd pairs in which none of the joints are so broad: the serration of the edges of the merus is different, the terminal spine of the anterior border being greatly enlarged; the anterior border of the carpus has a spine at each end, but is not otherwise serrated; and the dactylus and propodite, though thin and compressed, and otherwise quite like those of *P. serripes*, are not broadened, being much less foliaceous.

In the Indian Museum is a single non-adult male from off the Andamans: its carapace is nearly 7 millim. long and 8 millim. broad.

Family PTENOPLACIDÆ.

PTENOPLAX, Alcock & Anderson.

*Archæoplax*, Alcock and Anderson, Journ. As. Soc. Bengal, Vol. LXIII. pt. 2, 1894, p. 180.

*Ptenoplas*, Alcock and Anderson, Illustrations of the Zoology of the Investigator, Crust. pl. xv. 1895: Alcock, Investigator Brachyura, p. 78.

As the generic diagnosis has already been published in this Journal (loc. cit. *Archæoplax*) the above references are sufficient.

186. *Ptenoplas notopus*, Alcock & Anderson.

*Archæoplax notopus*, Alcock and Anderson, Journ. As. Soc. Bengal, LXIII. pt. 2, 1894, p. 181, pl. ix. fig. 3.

*Ptenoplas notopus*, Alcock and Anderson, Ill. Zool. Investigator, Crust., pl. xv. fig. 2: Alcock, Investigator Brachyura, p. 79.







